VCCI TEST REPORT

according to

V-3/2012.04, Class B ITE

Equipment : Network Attached Storage

Model No. : N5550, ALL-NAS500, NDL-2555T

Applicant : **Thecus Technology Corp**
15F., No. 79, Sec. 1, Sintai 5th Rd., Sijhih Dist,
New Taipei City 221, Taiwan

Statement

- The test result refers exclusively to the test presented test model / sample.
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SPORTON International Inc.

6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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History of this test report

Report No.	Version	Issue Date	Description
JV251566	Rev.01	Aug. 17, 2012	Initial issue of report

Certificate No. : JV251566

CERTIFICATE OF COMPLIANCE

according to

V-3/2012.04, Class B ITE

Equipment : Network Attached Storage

Model No. : N5550, ALL-NAS500, NDL-2555T

Applicant : **Thecus Technology Corp**
15F., No. 79, Sec. 1, Sintai 5th Rd., Sijhih Dist,
New Taipei City 221, Taiwan

I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **Implementation Regulation from Voluntary Control Council for Interference (VCCI) by Information Technology Equipment.** The energy emitted by this equipment was ***passed*** both Radiated and Conducted Emissions **Class B ITE** limits.
The test was carried out on ***Jul. 30, 2012*** at **SPORTON International Inc.** LAB.

Reviewed by:

Jack Deng
Engineer Dept. Manager

Approved by:

Alex Chen
Q.A Dept. Director

SPORTON International Inc.
6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

1. General Description of Equipment under Test

1.1. Applicant

Thecus Technology Corp

15F., No. 79, Sec. 1, Sintai 5th Rd., Sijhih Dist, New Taipei City 221, Taiwan

1.2. Manufacturer

Same as 1.1

1.3. Basic Description of Equipment under Test

Equipment	:	Network Attached Storage
Model No.	:	N5550, ALL-NAS500, NDL-2555T
Trade Name	:	Thecus, ALLNET, Starline
RJ45 Cable	:	Non-Shielded, 3 m
Associated with interface cables		
RJ45 Cable	:	Non-Shielded, 20 m
Data Cable Type	:	Please see section 2.2 of this test report for details
Power Supply Type	:	From Switching Power Supply
AC Power Cord	:	Non-Shielded, 1.8 m, 3 pin

1.4. Feature of Equipment under Test

Please refer to user manual.

2. Test Configuration of Equipment under Test

2.1. Test Manner

a. During testing, the personal computer and equipment positions were varied according to Implementation Regulation from Voluntary Control Council for Interference (VCCI) by Information Technology Equipment.

b. The equipment under test were performed the following test modes:

Test Items	Function Type
AC Conducted Emission	Mode 1. WAN 1Gbps:R/W, LAN 1Gbps:PING, D-SUB OUT Mode 2. LAN 1Gbps:R/W, WAN 1Gbps:PING, HDMI OUT cause “mode 2” generated the worst test result; it was reported as final data.
ISN	Mode 1. LAN: 10Mbps, R/W(HDD), WAN: 1Gbps, HDMI OUT Mode 2. LAN: 100Mbps, R/W(HDD), WAN: 1Gbps, HDMI OUT Mode 3. LAN: 1Gbps, R/W(HDD), WAN: 1Gbps, HDMI OUT
Radiated Emissions	Mode 1. WAN 1Gbps:R/W, LAN 1Gbps:PING, D-SUB OUT Mode 2. LAN 1Gbps:R/W, WAN 1Gbps:PING, HDMI OUT **< below 1GHz >** cause “mode 2” generated the worst test result; it was reported as final data. **< above 1GHz >** cause “mode 2” is highest frequency of the internal sources of the EUT; it was reported as final data.

c. Frequency range investigated: Conduction 150 kHz to 30 MHz, Radiation 30 MHz to 6,000 MHz.

2.2. Description of Test System

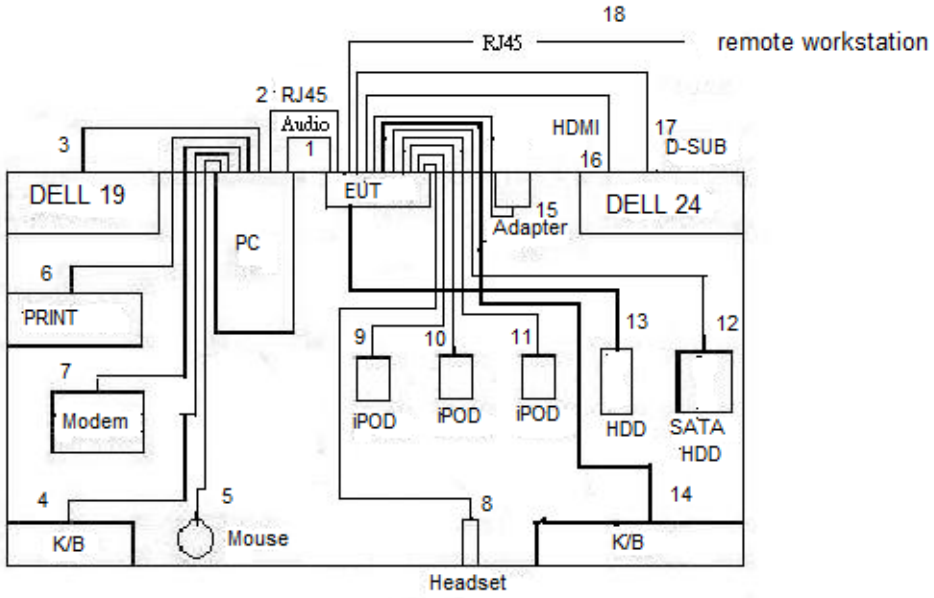
<Conducted and Radiated below 1GHz>

No.	Peripheral	Manufacturer	Model Number	FCC ID	Cable / Spec. Description	Placed
1	Personal Computer	DELL	DCTA	DoC	N/A	Local
2	LCD Monitor	DELL	E198WFPF	DoC	D-SUB Cable, D-Shielded, 1.8m	Local
3	LCD Monitor	DELL	U2410	DoC	D-SUB Cable, D-Shielded, 1.8m HDMI Cable, D-Shielded, 1.5m	Local
4	Keyboard x2	DELL	SK-8175	DoC	USB Cable, AL-F-Shielded, 1.8m x2	Local
5	Mouse	DELL	MOC5UO	DoC	USB Cable, AL-F-Shielded, 1.8m	Local
6	Printer	HP	C2642A(DJ400)	B94C2642X	LPT Cable, D-Shielded, 1.2m	Local
7	Modem	ACEEX	DM1414	IFAXDM1414	RS-232 Cable, D-Shielded, 1.15m	Local
8	Headest	i-Acon	HOH-323-BK	N/A	Audio Cable, Non-Shielded, 2.0m	Local
9	USB 2.0 IPOD x3	APPLE	A1137	DoC	USB Cable, D-Shielded, 1.0m x3	Local
10	SATA HDD	EXCEDING	MAP-AD21CS	DoC	SATA Cable, D-Shielded, 1.0m	Local
11	USB 3.0 HDD	PQI	H566	DoC	USB Cable, D-Shielded, 1.0m	Local
12	Personal Computer	DELL	DCTA	DoC	N/A	Remote
13	LCD Monitor	DELL	E198WFPF	DoC	D-SUB Cable, D-Shielded, 1.8m	Remote
14	Keyboard	DELL	SK-8175	DoC	USB Cable, AL-F-Shielded, 1.8m x2	Remote
15	Mouse	DELL	MOC5UO	DoC	USB Cable, AL-F-Shielded, 1.8m	Remote

<Radiation above 1GHz test>

No.	Peripheral	Manufacturer	Model Number	FCC ID	Cable / Spec. Description	Placed
1	Personal Computer	HP	DC7700	DoC	N/A	Local
2	LCD Monitor	DELL	U2410f	DoC	D-SUB Cable, D-Shielded, 1.8m	Local
3	LCD Monitor	DELL	U2410f	DoC	D-SUB Cable, D-Shielded, 1.8m HDMI Cable, D-Shielded, 1.8m	Local
4	Keyboard	HP	KB-0133	DoC	PS/2 Cable, AL-F-Shielded, 1.8m	Local
5	Keyboard	MICROSOFT	1366	DoC	USB Cable, AL-F-Shielded, 2m	Local
6	Mouse	HP	M-S69	JNZ211443	PS/2 Cable, AL-F-Shielded, 1.8m	Local
7	Printer	HP	C2642A(DJ400)	B94C2642X	LPT Cable, D-Shielded, 1.8m	Local
8	Modem	ACEEX	DM1414	IFAXDM1414	RS-232 Cable, B-Shielded, 1.15m	Local
9	iPod x3	Apple	A1051	DoC	USB Cable, B-Shielded, 1m	Local
10	e-SATA HDD	Mapower	MAP-AD21CS	DoC	SATA Cable, D-Shielded, 1m	Local
11	USB 3.0 HDD	WD	WDBACX0010BBK-PESN	DoC	USB Cable, D-Shielded, 0.95m	Local
12	Notebook PC	DELL	PP32LB	DoC	N/A	Remote

2.3. Connection Diagram of Test System



1. The Audio cable is connected from the PC to the EUT.
2. The RJ45 cable is connected from the PC to the EUT.
3. The I/O cable is connected from the PC to the support unit 2.
4. The I/O cable is connected from the PC to the support unit 4.
5. The I/O cable is connected from the PC to the support unit 5.
6. The I/O cable is connected from the PC to the support unit 6.
7. The I/O cable is connected from the PC to the support unit 7.
8. The I/O cable is connected from the EUT to the support unit 8.
9. The I/O cable is connected from the EUT to the support unit 9.
10. The I/O cable is connected from the EUT to the support unit 9.
11. The I/O cable is connected from the EUT to the support unit 9.
12. The I/O cable is connected from the EUT to the support unit 10.
13. The I/O cable is connected from the EUT to the support unit 11.
14. The I/O cable is connected from the EUT to the support unit 4.
15. The I/O cable is connected from the EUT to the Adapter.
16. The HDMI cable is connected from the EUT to the support unit 3.
17. The D-SUB cable is connected from the EUT to the support unit 3.
18. The RJ45 cable is connected from the EUT to the remote workstation.

Note: Above support unit on behalf of the meaning, please refer to section 2.2.

3. Test Software

Two executive programs, “EMIprogram.exe & EMITEST.exe” under WIN XP, which generates a complete line of continuously repeating "H" pattern was used as the test software.

The program was executed as follows :

a. Turn on the power of all equipment.
b. The PC reads the test program from the hard disk drive and runs it.
c. The PC sends "H" pattern to the monitor, and the monitor displays "H" patterns on the screen.
d. The PC sends "H" messages to the printer, and then the printer prints them on the paper.
e. The PC sends signal messages to the modem.
f. The PC sends signal messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
g. Repeat the steps from c to f.

At the same time, the following programs were executed:

- Executed " ping.exe” to link with the EUT to receive and transmit data by RJ45 cable.
- Executed “Winthrax.exe” to read and write data from external USB 2.0 IPOD, SATA&USB 2.0 HDD and USB 3.0 HDD.

During the test, the following program under Win XP from remote workstation was executed:

- Executed “Ping.exe” to link with the EUT to receive and transmit data via RJ45 cable.

For ISN test, the PC Executed “tfgen.exe” to traffic packet data generated software and keep 10% traffic load to link with the EUT by RJ45 cable.

4. General Information of Test

4.1. Test Facility

Test Site：SPORTON INTERNATIONAL INC.

Test Site Location : No. 3, Lane 238, Kang Lo Street, Nei Hwu District, Taipei 11424, Taiwan, R.O.C.
TEL : 886-2-2631-4739
FAX : 886-2-2631-9740

Test Site No. : CO01-NH, OS02-NH (VCCI Registration No.: C-247/R-1906)

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiag, Tao Yuan Hsien, Taiwan, R.O.C.
TEL : 886-3-327-3456
FAX : 886-3-318-0055

Test Site No. : 10CH02-HY (VCCI Registration No.: G-126)

<Telecommunication Port>

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiag, Tao Yuan Hsien, Taiwan, R.O.C.
TEL : 886-3-327-3456
FAX : 886-3-318-0055

Test Site No. : CO01-HY (VCCI Registration No.: T-1731)

4.2. Test Voltage

AC 100V / 50Hz

4.3. Measurement Procedure

Implementation Regulation from Voluntary Control Council for Interference (VCCI) by Information Technology Equipment.

The test configuration, test modes and test software used in this test report are designated by the applicant.

4.4. Test in Compliance with

V-3/2012.04, Class B ITE

4.5. Frequency Range Investigated

a. Conducted emission test: from 150 kHz to 30 MHz
b. Radiated emission test: from 30 MHz to 6,000 MHz

4.6. Test Distance

a. The test distance of radiated emission test from antenna to EUT is 10 M (from 30MHz~1GHz).
b. The test distance of radiated emission test from antenna to EUT is 3 M (from 1GHz~6GHz).

5. Test of Conducted Powerline

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz and return leads of the EUT according to the methods defined in Implementation Regulation from Voluntary Control Council for Interference (VCCI) by Information Technology Equipment, Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meter above the ground plane as shown in section 5.4. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position producing maximum conducted emissions.

5.1. Limits for conducted disturbance at mains terminals and telecommunication ports

Limits for conducted disturbance at mains terminals

Frequency range (MHz)	Class A Limits dB(μV)		Class B Limits dB(μV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.50	79	66	66 - 56	56 - 46
0.50 to 5	73	60	56	46
5 to 30	73	60	60	50

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Limits for conducted disturbance at telecommunication ports

Frequency range (MHz)	Class A			
	Voltage limits dB (μV)		Current limits dB (μA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.50	97 - 87	84 - 74	53 - 43	40 - 30
0.50 to 30	87	74	43	30

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Frequency range (MHz)	Class B			
	Voltage limits dB (μV)		Current limits dB (μA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.50	84 - 74	74 - 64	40 - 30	30 - 20
0.50 to 30	74	64	30	20

NOTE: The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

5.2. Description of Major Test Instruments

Test Receiver Parameters	Setting
Test Receiver	R&S ESCS 30
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz
Signal Input	9 kHz - 2.75 GHz

5.3. Test Procedures

a. The EUT was placed on a desk 0.8 meter height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meter from any other grounded conducting surface.

b. Connect EUT to the power mains through a line impedance stabilization network (LISN).

c. Connect Telecommunication port to ISN (Impedance Stabilization Network).

d. All the support units are connect to the other LISN.

e. The LISN provides 50 ohm coupling impedance for the measuring instrument.

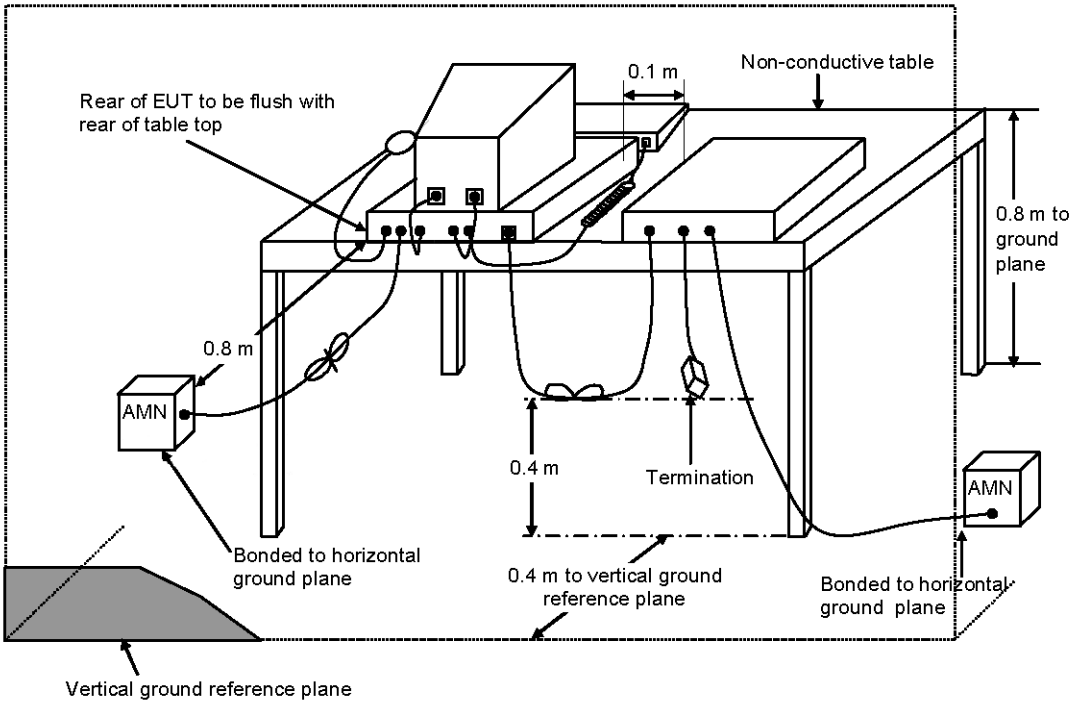
f. The CISPR states that a 50 ohm, 50 microhenry LISN should be used.

g. Both sides of AC line were checked for maximum conducted interference.

h. The frequency range from 150 kHz to 30 MHz was searched.

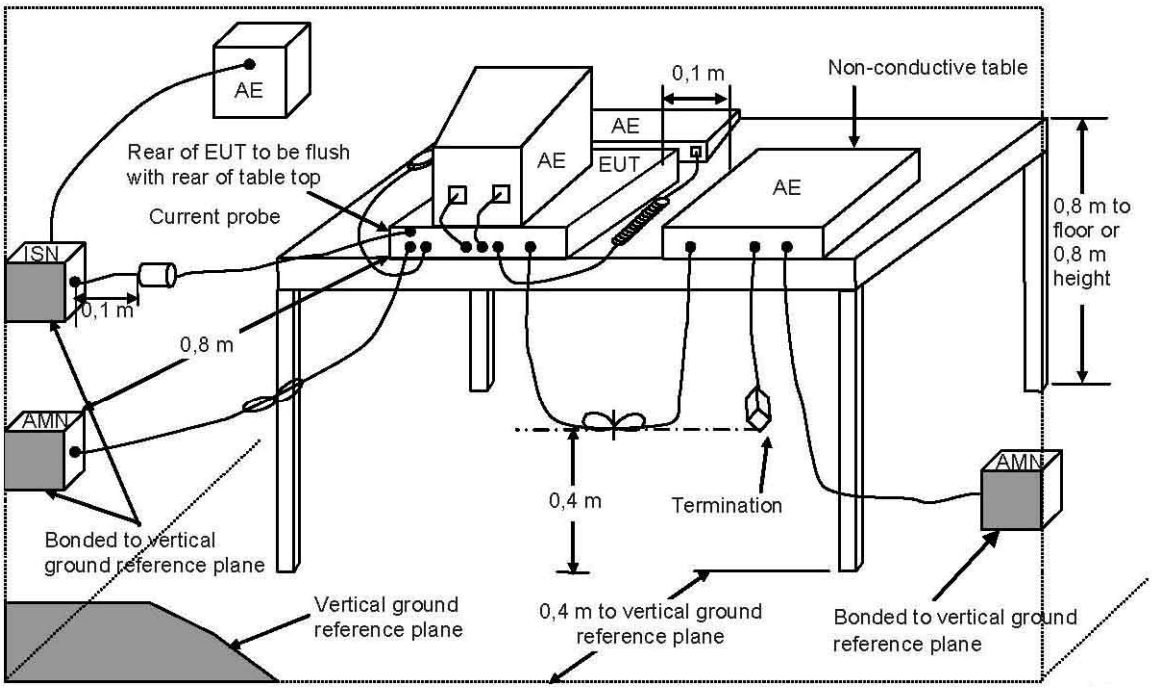
i. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

5.4. Typical Test Setup Layout of Conducted Powerline



a. AMN is 80 cm from the EUT and at least 80 cm from other units and other metal planes.
b. EUT is connected to one artificial mains network (AMN).
c. All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.
d. Rear of EUT to be flushed with rear of table top.
e. Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.
f. If cables, which hang closer than 40 cm to the horizontal metal ground plane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.
g. Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.
h. Cables of hand operated devices, such as keyboards, mice, etc. shall be placed as for normal usage.

5.5. Typical Test Setup Layout of disturbances at telecommunication ports



EUT = Equipment under test
AE = Associated equipment
AMN = artificial mains network
ISN = impedance stabilization networks

a. AMN and ISN are 80 cm from the EUT and at least 80 cm from other units and other metal planes.
b. EUT is connected to one artificial mains network (AMN).
c. All other units of a system are powered from a second AMN. A multiple outlet strip can be used for multiple mains cords.
d. Rear of EUT to be flushed with rear of table top.
e. Peripherals shall be placed at a distance of 10 cm from each other and from the controller, except for the monitor which, if this is an acceptable installation practice, shall be placed directly on the top of the controller.
f. If cables, which hang closer than 40 cm to the horizontal metal ground plane, cannot be shortened to appropriate length, the excess shall be folded back and forth forming a bundle 30 cm to 40 cm long.
g. Mains cords and signal cables shall be positioned for their entire lengths, as far as possible, at 40 cm from the vertical reference plane.
h. Cables of hand operated devices, such as keyboards, mice, etc. shall be placed as for normal usage.

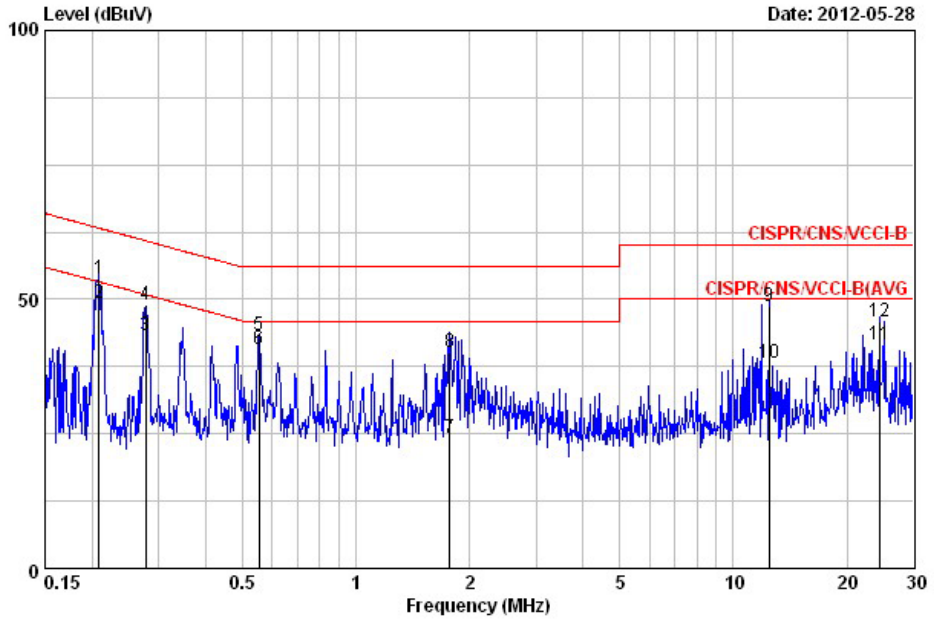
5.6. Test Result of AC Powerline Conducted Emission

Test Mode	Mode 2	Test Site No.	CO01-NH
Test Frequency	0.15 MHz ~ 30 MHz	Test Engineer	Eddie
Temperature	24 ℃	Relative Humidity	56 %

Note: 1. Corrected Reading (dBμV) = LISN Factor + Cable Loss + Read Level = Level
2. All emissions not reported here are more than 10 dB below the prescribed limit.

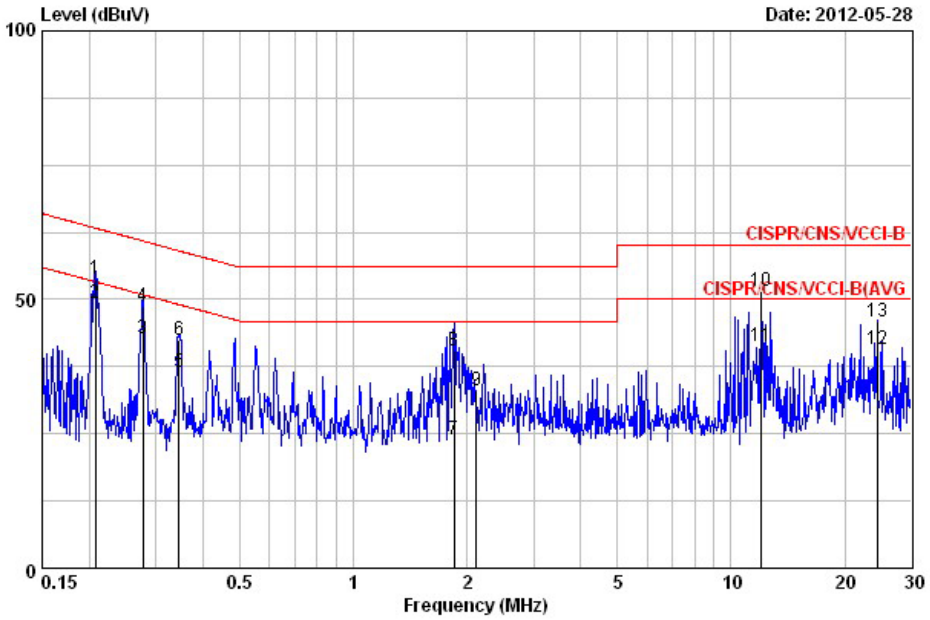
■ The test was passed at the minimum margin that marked by the frame in the following data

Line



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.208	53.93	-9.34	63.27	43.67	10.16	0.10	QP
2 @	0.208	49.17	-4.10	53.27	38.91	10.16	0.10	AVERAGE
3 @	0.277	43.40	-7.50	50.90	33.14	10.16	0.10	AVERAGE
4	0.277	49.01	-11.89	60.90	38.75	10.16	0.10	QP
5	0.553	43.40	-12.60	56.00	33.14	10.17	0.10	QP
6 @	0.553	40.62	-5.38	46.00	30.36	10.17	0.10	AVERAGE
7	1.772	24.22	-21.78	46.00	13.93	10.19	0.10	AVERAGE
8	1.772	40.07	-15.93	56.00	29.78	10.19	0.10	QP
9 @	12.455	48.74	-11.26	60.00	38.21	10.34	0.20	QP
10	12.455	38.23	-11.77	50.00	27.70	10.34	0.20	AVERAGE
11 @	24.351	41.73	-8.27	50.00	30.93	10.50	0.30	AVERAGE
12	24.351	45.76	-14.24	60.00	34.96	10.50	0.30	QP

Neutral



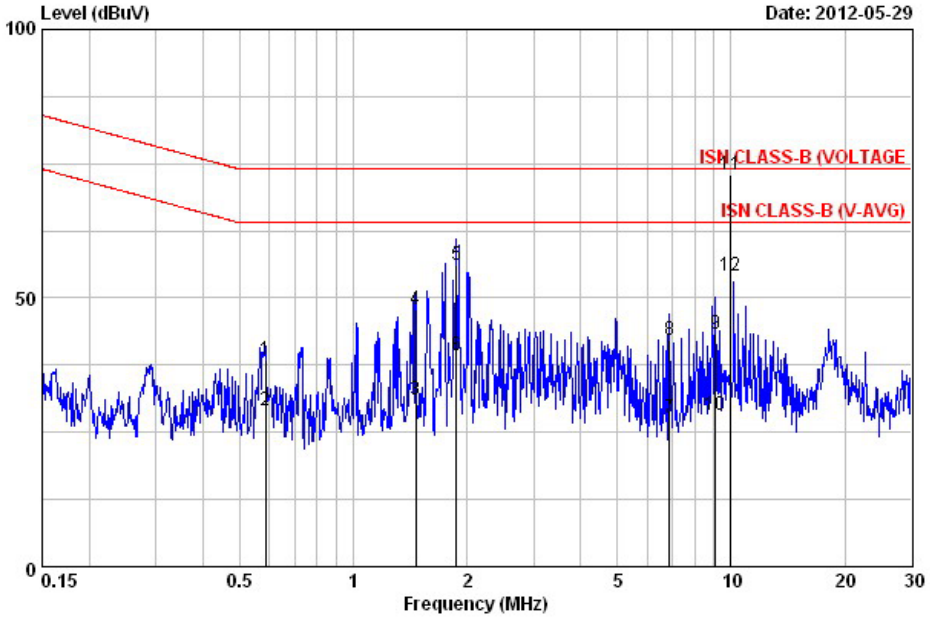
	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.207	53.95	-9.37	63.32	43.71	10.14	0.10	QP
2 @	0.207	49.29	-4.03	53.32	39.05	10.14	0.10	AVERAGE
3 @	0.277	42.61	-8.29	50.90	32.37	10.14	0.10	AVERAGE
4	0.277	48.61	-12.29	60.90	38.37	10.14	0.10	QP
5	0.345	36.37	-12.72	49.09	26.13	10.14	0.10	AVERAGE
6	0.345	42.57	-16.52	59.09	32.33	10.14	0.10	QP
7	1.848	23.98	-22.02	46.00	13.71	10.17	0.10	AVERAGE
8	1.848	40.34	-15.66	56.00	30.07	10.17	0.10	QP
9	2.121	33.11	-22.89	56.00	22.83	10.17	0.11	Peak
10 @	11.972	51.58	-8.42	60.00	41.05	10.34	0.20	QP
11 @	11.972	41.18	-8.82	50.00	30.65	10.34	0.20	AVERAGE
12 @	24.355	40.70	-9.30	50.00	29.83	10.57	0.30	AVERAGE
13	24.355	45.83	-14.17	60.00	34.96	10.57	0.30	QP

5.7. Test Result of disturbances at telecommunication ports

Test Mode	Mode 1	Test Site No.	CO01-HY
Test Frequency	0.15 MHz ~ 30 MHz	Test Engineer	Eddie
Temperature	24 ℃	Relative Humidity	56 %

Note: 1. Corrected Reading (dBμV) = LISN Factor + Cable Loss + Read Level = Level
2. All emissions not reported here are more than 10 dB below the prescribed limit.

■ The test was passed at the minimum margin that marked by the frame in the following data

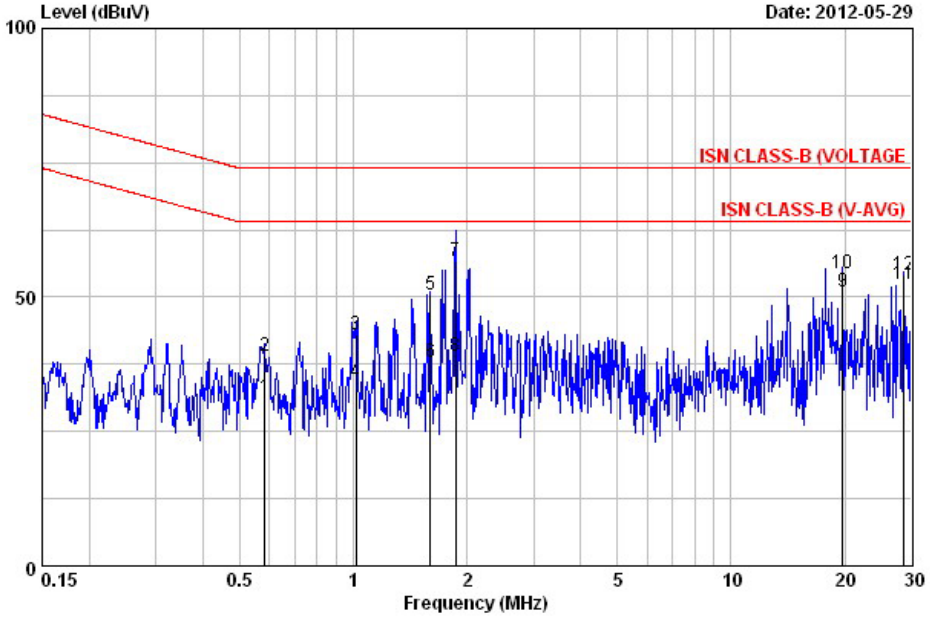


	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.585	38.58	-35.42	74.00	28.67	9.81	0.10	QP
2	0.585	29.09	-34.91	64.00	19.18	9.81	0.10	AVERAGE
3	1.464	30.95	-33.05	64.00	21.13	9.72	0.10	AVERAGE
4	1.464	47.91	-26.09	74.00	38.09	9.72	0.10	QP
5	1.878	56.26	-17.74	74.00	46.46	9.70	0.10	QP
6	1.878	39.34	-24.66	64.00	29.54	9.70	0.10	AVERAGE
7	6.878	27.54	-36.46	64.00	17.70	9.64	0.20	AVERAGE
8	6.878	42.16	-31.84	74.00	32.32	9.64	0.20	QP
9	9.107	43.39	-30.61	74.00	33.54	9.65	0.20	QP
10	9.107	28.07	-35.93	64.00	18.22	9.65	0.20	AVERAGE
11 @	10.000	72.88	-1.12	74.00	63.03	9.65	0.20	QP
12 @	10.000	54.25	-9.75	64.00	44.40	9.65	0.20	AVERAGE

Test Mode	Mode 2	Test Site No.	CO01-HY
Test Frequency	0.15 MHz ~ 30 MHz	Test Engineer	Eddie
Temperature	24 ℃	Relative Humidity	56 %

Note: 1. Corrected Reading (dBμV) = LISN Factor + Cable Loss + Read Level = Level
2. All emissions not reported here are more than 10 dB below the prescribed limit.

■ **The test was passed at the minimum margin that marked by the frame in the following data**

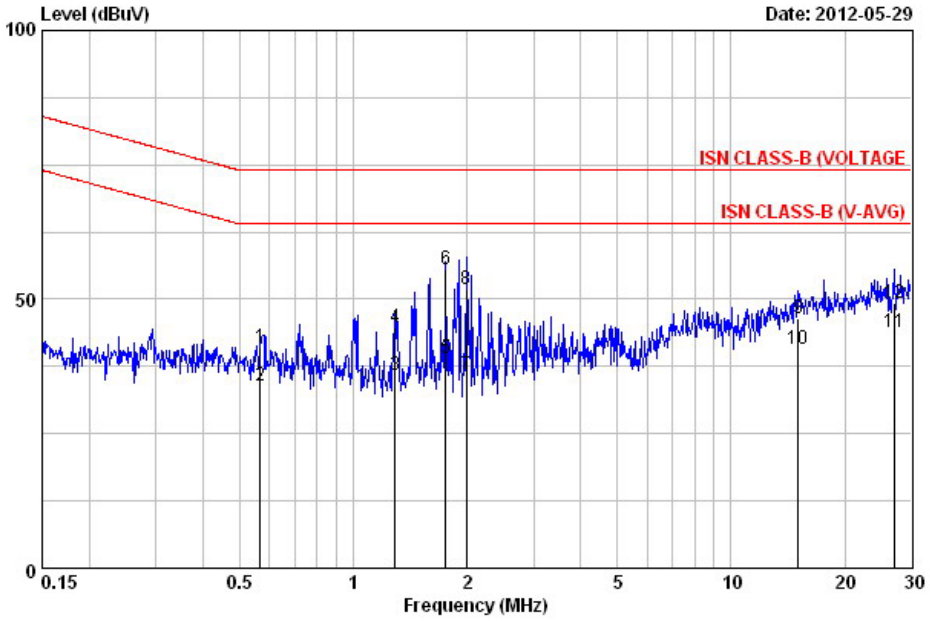


	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.582	31.45	-32.55	64.00	21.54	9.81	0.10	AVERAGE
2	0.582	38.96	-35.04	74.00	29.05	9.81	0.10	QP
3	1.016	43.13	-30.87	74.00	33.28	9.75	0.10	QP
4	1.016	34.31	-29.69	64.00	24.46	9.75	0.10	AVERAGE
5	1.602	50.36	-23.64	74.00	40.55	9.71	0.10	QP
6	1.602	37.90	-26.10	64.00	28.09	9.71	0.10	AVERAGE
7	1.868	56.79	-17.21	74.00	46.99	9.70	0.10	QP
8	1.868	38.98	-25.02	64.00	29.18	9.70	0.10	AVERAGE
9	19.710	51.00	-13.00	64.00	40.90	9.81	0.29	AVERAGE
10	19.710	54.31	-19.69	74.00	44.21	9.81	0.29	QP
11 @	28.684	52.29	-11.71	64.00	41.74	10.17	0.38	AVERAGE
12	28.684	54.12	-19.88	74.00	43.57	10.17	0.38	QP

Test Mode	Mode 3	Test Site No.	CO01-HY
Test Frequency	0.15 MHz ~ 30 MHz	Test Engineer	Eddie
Temperature	24 ℃	Relative Humidity	56 %

Note: 1. Corrected Reading (dBμV) = LISN Factor + Cable Loss + Read Level = Level
2. All emissions not reported here are more than 10 dB below the prescribed limit.

■ The test was passed at the minimum margin that marked by the frame in the following data



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.567	41.03	-32.97	74.00	31.12	9.82	0.10	QP
2	0.567	33.81	-30.19	64.00	23.90	9.82	0.10	AVERAGE
3	1.289	35.95	-28.05	64.00	26.12	9.73	0.10	AVERAGE
4	1.289	44.61	-29.39	74.00	34.78	9.73	0.10	QP
5	1.753	38.91	-25.09	64.00	29.11	9.70	0.10	AVERAGE
6	1.753	55.53	-18.47	74.00	45.73	9.70	0.10	QP
7	1.991	35.76	-28.24	64.00	25.97	9.69	0.10	AVERAGE
8	1.991	51.72	-22.28	74.00	41.93	9.69	0.10	QP
9	15.066	46.30	-27.70	74.00	36.42	9.68	0.20	QP
10	15.066	40.70	-23.30	64.00	30.82	9.68	0.20	AVERAGE
11	26.984	43.94	-20.06	64.00	33.50	10.10	0.34	AVERAGE
12	26.984	49.30	-24.70	74.00	38.86	10.10	0.34	QP

6. Test of Radiated Emission

Radiated emissions from 30 MHz to 6,000 MHz were measured with a bandwidth of 120 kHz for 30 MHz to 1000 MHz and 1 MHz for above 1GHz according to the methods defines in Implementation Regulation from Voluntary Control Council for Interference (VCCI) by Information Technology Equipment. The EUT was placed on a nonmetallic stand, 0.8 meter above the ground plane, as shown in section 6.4. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

6.1. Limits for radiated disturbance

Limits for radiated disturbance at a measuring distance of 10 m

Frequency range (MHz)	Class A	Class B
	Quasi-peak limits dB(μV/m)	Quasi-peak limits dB(μV/m)
30 to 230	40	30
230 to 1000	47	37

Limits for radiated disturbance at a measuring distance of 3 m

Frequency range (MHz)	Class A		Class B	
	Average limit dB(μV/m)	Peak limit dB(μV/m)	Average limit dB(μV/m)	Peak limit dB(μV/m)
1000 to 3000	56	76	50	70
3000 to 6000	60	80	54	74

6.2. Description of Major Test Instruments

For Below 1GHz

Amplifier Parameters	Setting
Amplifier	(BURGEON BPA-530)
RF Gain	30 dB
Signal Input	0.01 MHz - 3 GHz

Test Receiver Parameters	Setting
Test Receiver	(R&S ESCI)
Resolution Bandwidth	120 kHz
Frequency Band	9 kHz - 3 GHz
Quasi-Peak Detector	ON for Quasi-Peak Mode
	OFF for Peak Mode

For above 1GHz

Amplifier Parameters	Setting
Amplifier	(AGILENT 8449B)
RF Gain	35 dB
Signal Input	1 GHz – 26.5 GHz

Test Receiver Parameters	Setting
Test Receiver	(R&S ESI)
Attenuation	10 dB
Start Frequency	1000 MHz
Stop Frequency	6000 MHz
Resolution Bandwidth	1 MHz
Signal Input	20 Hz - 7 GHz

6.3. Test Procedures

For Below 1GHz

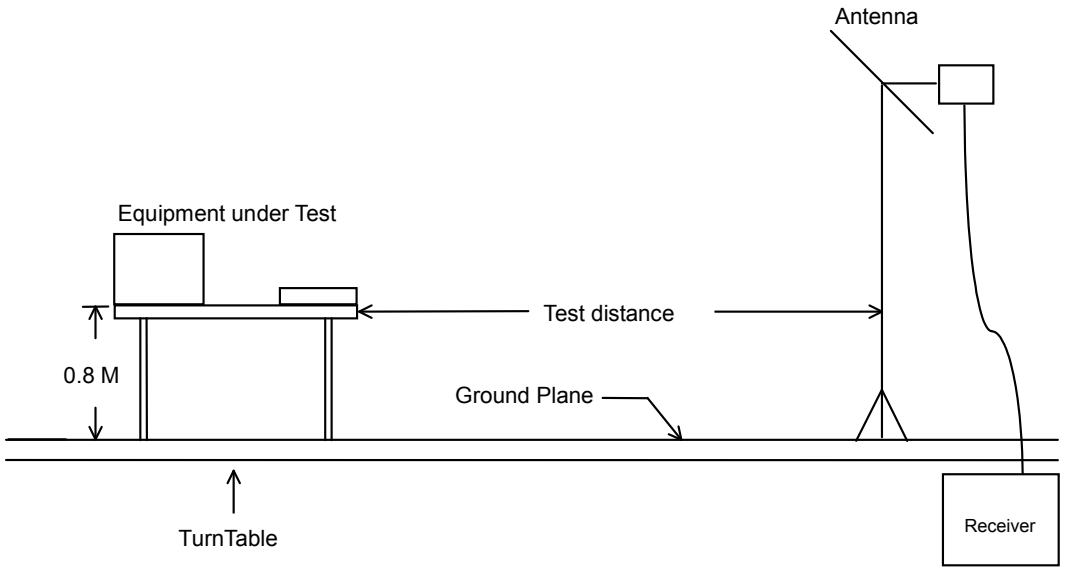
a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 10 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

For above 1GHz

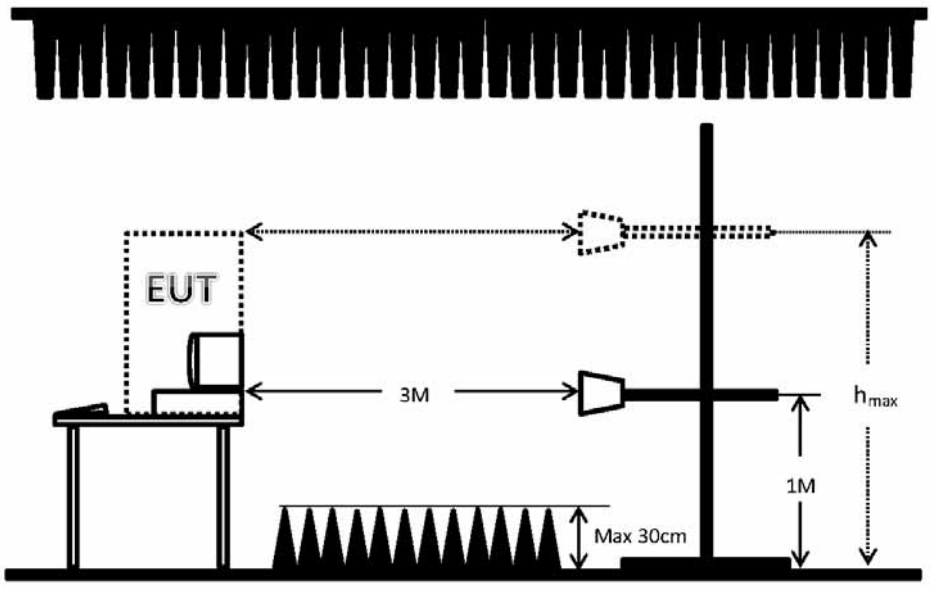
a. Same test set up as below 1GHz radiated testing.
b. The EUT was set 3 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
c. There should be absorber placed between the EUT and Antenna and its located size should let the test site meet CISPR16-1-4 requirement.
d. The table was rotated 360 degrees to determine the position of the highest radiation.
e. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
f. Set the DRG Horn Antenna (Model: 3115) at 1M height, then run the turn table to get the maximum noise reading from Horizontal and Vertical polarity separately.
g. When EUT locating on the turn-table, and its height is over 172cm (Antenna's 3dB beam width of 6GHz is 27°), the DRG Horn Antenna must be raised up and descended down, then turning around the turn-table to get the maximum noise reading of the Horizontal and Vertical polarity separately. Note the maximum raise up height is same as the top of EUT.
h. If emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

6.4. Typical Test Setup Layout of Radiated Emission

For Below 1GHz



For above 1GHz



Remark: When EUT's height is over 172cm, h_{max} = top of EUT

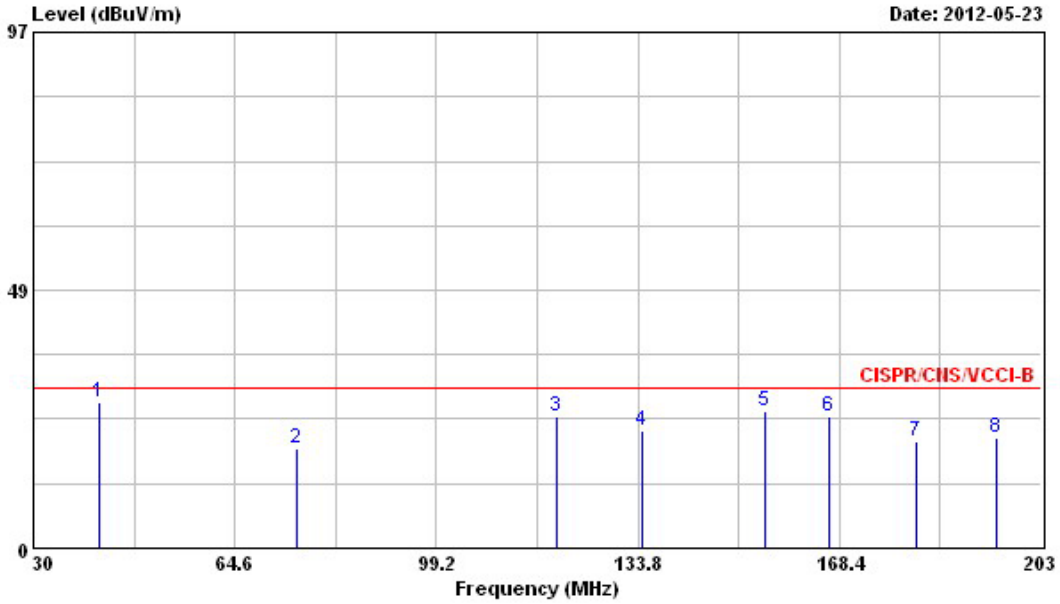
6.5. Test Result of Radiated Emission for Below 1GHz

Test mode	Mode 2	Test Site No.	OS02-NH
Test frequency	30 MHz ~ 1000 MHz	Test Engineer	Alan
Temperature	27 ℃	Relative Humidity	52 %

Note: 1. Emission level (dBμV/m) = 20 log Emission level (μV/m)
2. Corrected Reading : Antenna Factor + Cable Loss + Read Level – Preamp Factor = Level

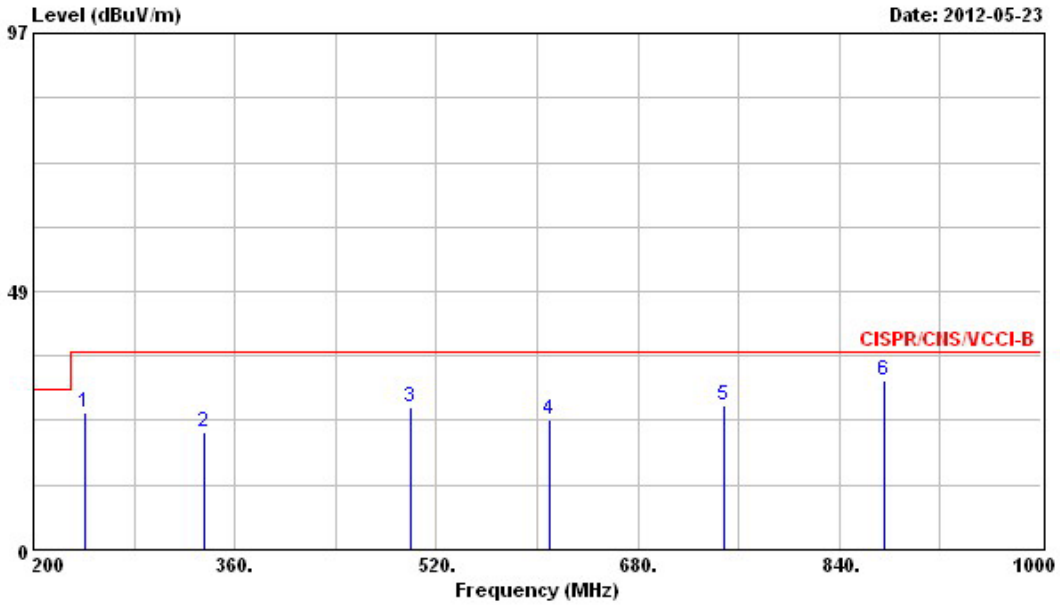
■ **The test was passed at the minimum margin that marked by the frame in the following data**

Vertical



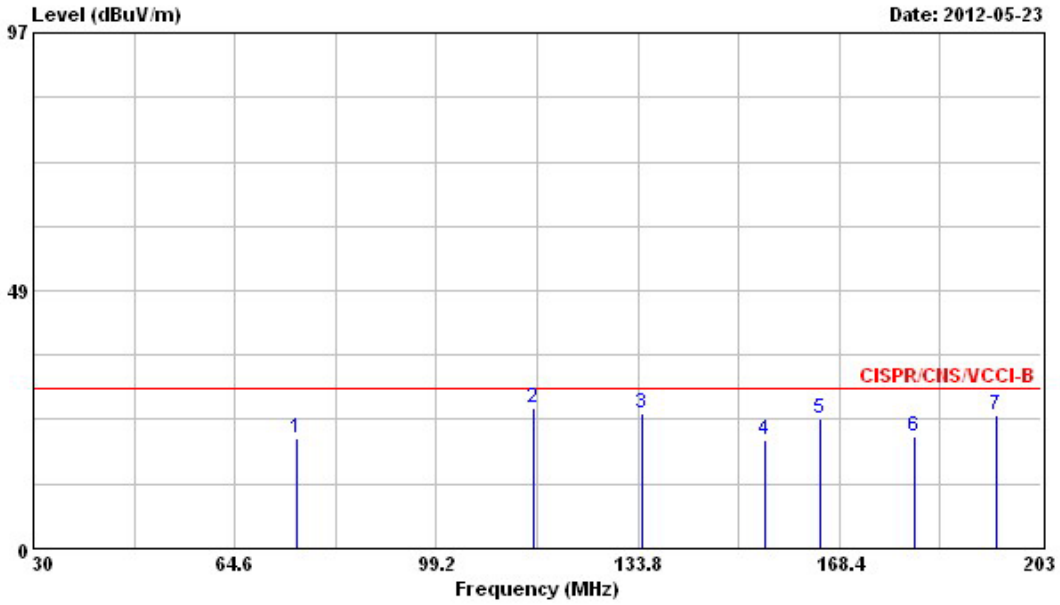
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	41.250	27.51	-2.49	30.00	41.17	12.99	1.11	27.76	QP	100	180
2	75.150	18.57	-11.43	30.00	37.95	6.81	1.46	27.65	Peak	---	---
3	119.790	24.65	-5.35	30.00	37.67	12.50	1.88	27.40	Peak	---	---
4	134.490	22.16	-7.84	30.00	36.14	11.36	1.98	27.32	Peak	---	---
5	155.600	25.74	-4.26	30.00	40.55	10.26	2.15	27.22	Peak	---	---
6	166.670	24.64	-5.36	30.00	39.80	9.77	2.23	27.16	Peak	---	---
7	181.550	19.95	-10.05	30.00	35.66	9.06	2.31	27.08	Peak	---	---
8	195.390	20.75	-9.25	30.00	36.02	9.27	2.47	27.01	Peak	---	---

Vertical



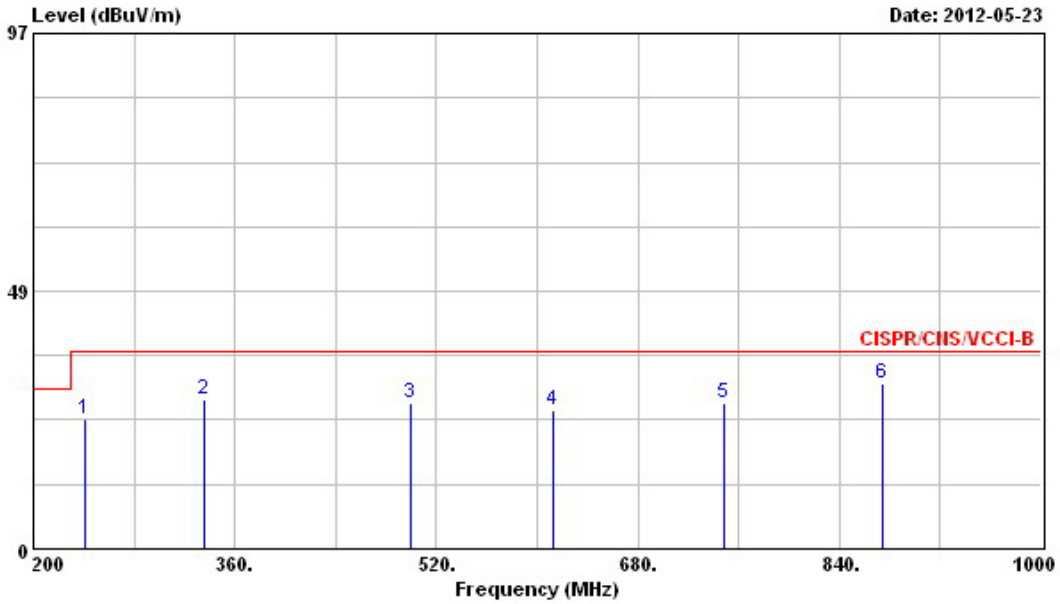
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	240.800	25.74	-11.26	37.00	38.03	11.77	2.81	26.87	Peak	---	---
2	336.000	21.92	-15.08	37.00	31.21	14.16	3.46	26.91	Peak	---	---
3	499.200	26.88	-10.12	37.00	32.44	17.55	4.74	27.85	Peak	---	---
4	609.600	24.35	-12.65	37.00	27.59	19.11	5.51	27.86	Peak	---	---
5	748.800	27.10	-9.90	37.00	27.92	19.97	6.70	27.49	Peak	---	---
6	876.000	31.61	-5.39	37.00	29.73	21.38	7.76	27.26	Peak	---	---

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	75.150	20.77	-9.23	30.00	40.15	6.81	1.46	27.65	Peak	---	---
2	115.810	26.32	-3.68	30.00	39.89	12.02	1.83	27.42	Peak	---	---
3	134.490	25.56	-4.44	30.00	39.54	11.36	1.98	27.32	Peak	---	---
4	155.600	20.34	-9.66	30.00	35.15	10.26	2.15	27.22	Peak	---	---
5	165.110	24.28	-5.72	30.00	39.35	9.89	2.21	27.17	Peak	---	---
6	181.380	20.95	-9.05	30.00	36.66	9.06	2.31	27.08	Peak	---	---
7	195.390	25.15	-4.85	30.00	40.42	9.27	2.47	27.01	Peak	---	---

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	240.800	24.54	-12.46	37.00	36.83	11.77	2.81	26.87	Peak	---	---
2	336.000	28.12	-8.88	37.00	37.41	14.16	3.46	26.91	Peak	---	---
3	499.200	27.28	-9.72	37.00	32.84	17.55	4.74	27.85	Peak	---	---
4	612.800	26.16	-10.84	37.00	29.35	19.12	5.54	27.85	Peak	---	---
5	748.800	27.30	-9.70	37.00	28.12	19.97	6.70	27.49	Peak	---	---
6	874.400	30.99	-6.01	37.00	29.13	21.37	7.75	27.26	Peak	---	---

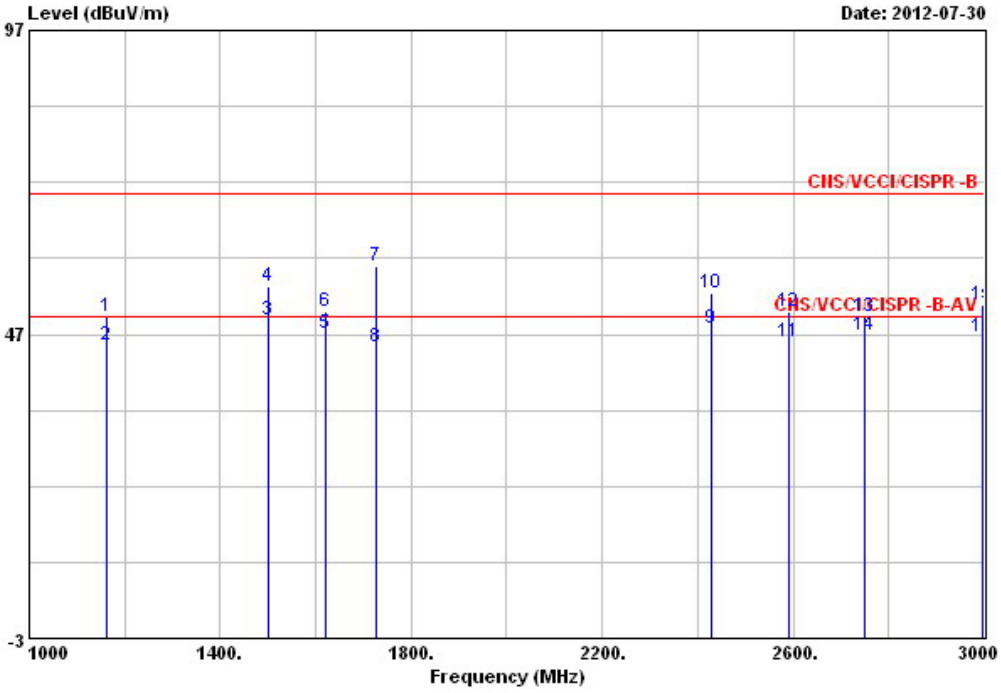
6.6. Test Result of Radiated Emission for Above 1GHz

Test mode	Mode 2	Test Site No.	10CH02-HY
Test frequency	1 GHz ~ 6 GHz	Test Engineer	Nicky
Temperature	26 ℃	Relative Humidity	45 %

Note: 1. Emission level (dBμV/m) = 20 log Emission level (μV/m)
2. Corrected Reading : Antenna Factor + Cable Loss + Read Level – Preamp Factor = Level

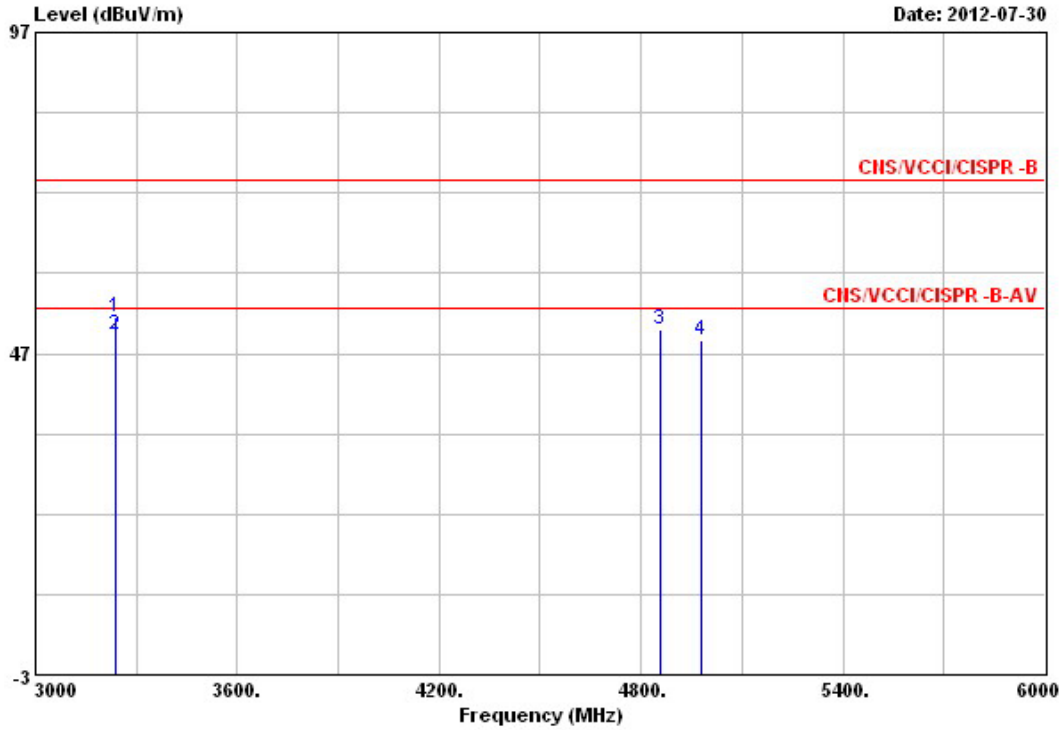
■ **The test was passed at the minimum margin that marked by the frame in the following data**

Vertical



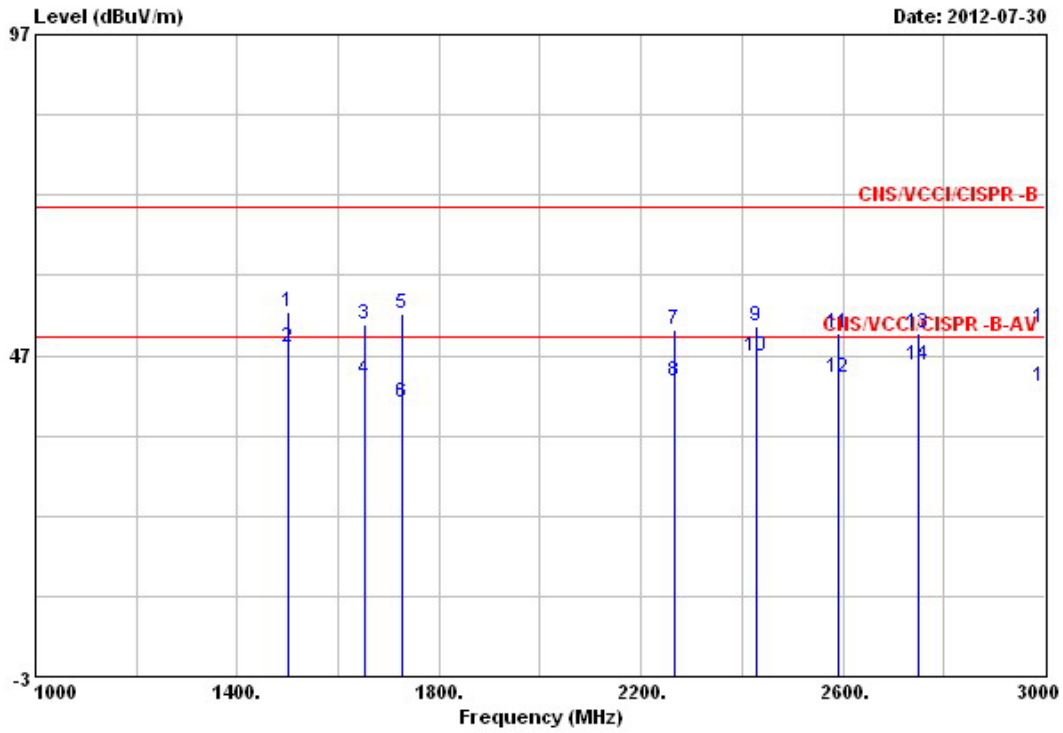
	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg
1	1164.000	50.04	-19.96	70.00	54.30	33.93	5.42	24.25	Peak	---	---
2	1164.000	45.31	-4.69	50.00	49.57	33.93	5.42	24.25	Average	100	20
3 @	1500.000	49.26	-0.74	50.00	51.43	33.45	6.18	25.10	Average	100	130
4	1500.000	54.82	-15.18	70.00	56.99	33.45	6.18	25.10	Peak	---	---
5	1620.000	47.21	-2.79	50.00	48.59	33.44	6.49	25.57	Average	100	150
6	1620.000	50.63	-19.37	70.00	52.01	33.44	6.49	25.57	Peak	---	---
7	1726.000	58.09	-11.91	70.00	58.72	33.42	6.76	26.03	Peak	---	---
8	1726.000	44.79	-5.21	50.00	45.42	33.42	6.76	26.03	Average	100	12
9	2428.000	47.95	-2.05	50.00	45.41	33.56	7.88	28.22	Average	100	120
10	2428.000	53.81	-16.19	70.00	51.27	33.56	7.88	28.22	Peak	---	---
11	2590.000	45.62	-4.38	50.00	42.42	33.63	8.09	28.74	Average	100	125
12	2590.000	50.75	-19.25	70.00	47.55	33.63	8.09	28.74	Peak	---	---
13	2750.000	49.95	-20.05	70.00	46.05	33.73	8.38	29.25	Peak	---	---
14	2750.000	46.77	-3.23	50.00	42.87	33.73	8.38	29.25	Average	100	140
15	2998.000	51.80	-18.20	70.00	46.77	33.85	8.78	30.10	Peak	---	---
16	2998.000	46.46	-3.54	50.00	41.43	33.85	8.78	30.10	Average	100	350

Vertical



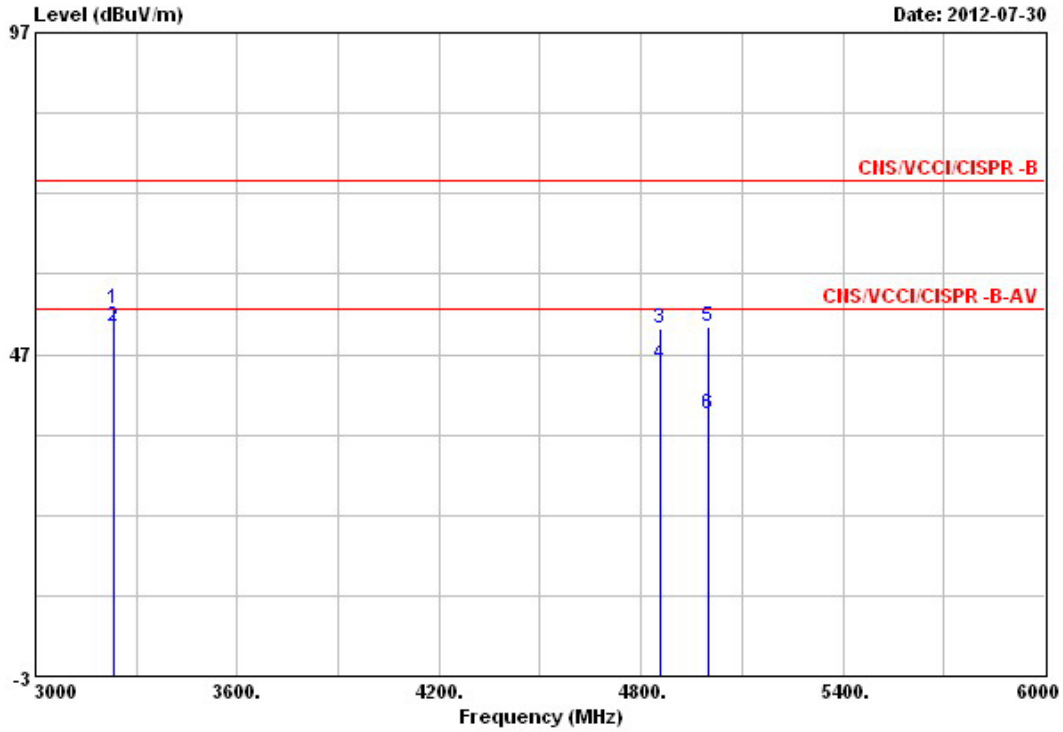
	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg
1	3237.000	52.69	-21.31	74.00	46.92	33.86	9.10	30.53	Peak	---	---
2	3237.000	49.88	-4.12	54.00	44.11	33.86	9.10	30.53	Average	100	250
3	4857.000	50.69	-23.31	74.00	40.42	33.87	11.29	32.85	Peak	---	---
4	4977.000	49.02	-24.98	74.00	38.33	33.86	11.48	33.07	Peak	---	---

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg
1	1500.000	53.75	-16.25	70.00	55.92	33.45	6.18	25.10	Peak	---	---
2	1500.000	48.37	-1.63	50.00	50.54	33.45	6.18	25.10	Average	100	140
3	1654.000	51.90	-18.10	70.00	53.05	33.43	6.58	25.70	Peak	---	---
4	1654.000	43.21	-6.79	50.00	44.36	33.43	6.58	25.70	Average	100	160
5	1726.000	53.49	-16.51	70.00	54.12	33.42	6.76	26.03	Peak	---	---
6	1726.000	39.79	-10.21	50.00	40.42	33.42	6.76	26.03	Average	100	200
7	2268.000	50.93	-19.07	70.00	48.88	33.50	7.73	27.82	Peak	---	---
8	2268.000	43.03	-6.97	50.00	40.98	33.50	7.73	27.82	Average	100	170
9	2428.000	51.51	-18.49	70.00	48.97	33.56	7.88	28.22	Peak	---	---
10	2428.000	46.90	-3.10	50.00	44.36	33.56	7.88	28.22	Average	100	190
11	2590.000	50.47	-19.53	70.00	47.27	33.63	8.09	28.74	Peak	---	---
12	2590.000	43.62	-6.38	50.00	40.42	33.63	8.09	28.74	Average	100	150
13	2750.000	50.41	-19.59	70.00	46.51	33.73	8.38	29.25	Peak	---	---
14	2750.000	45.59	-4.41	50.00	41.69	33.73	8.38	29.25	Average	100	200
15	3000.000	51.24	-18.76	70.00	46.21	33.85	8.78	30.10	Peak	---	---
16	3000.000	42.17	-7.83	50.00	37.14	33.85	8.78	30.10	Average	100	180

Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Preamp Factor	Cable Loss	Antenna Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB/m		cm	deg
1	3234.000	54.18	-19.82	74.00	48.44	33.86	9.10	30.50	Peak	---	---
2	3234.000	51.36	-2.64	54.00	45.62	33.86	9.10	30.50	Average	100	160
3	4857.000	51.13	-22.87	74.00	40.86	33.87	11.29	32.85	Peak	---	---
4	4857.000	45.57	-8.43	54.00	35.30	33.87	11.29	32.85	Average	100	120
5	4999.000	51.31	-22.69	74.00	40.56	33.86	11.51	33.10	Peak	---	---
6	4999.000	37.85	-16.15	54.00	27.10	33.86	11.51	33.10	Average	100	250

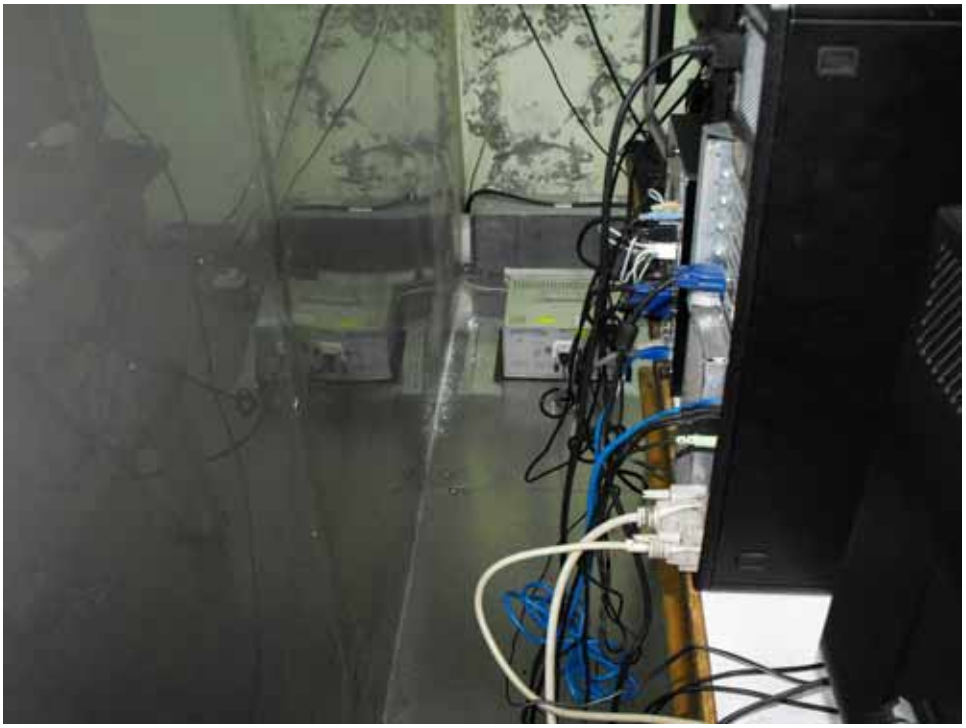
7. Photographs of Test Configuration

7.1. Photographs of AC Powerline Conducted Emissions Test Configuration

● The photographs show the configuration that generates the maximum emission.

FRONT VIEW

REAR VIEW



7.2. Photographs of Radiated Emissions Test Configuration

● The photographs show the configuration that generates the maximum emission.
For Below 1GHz

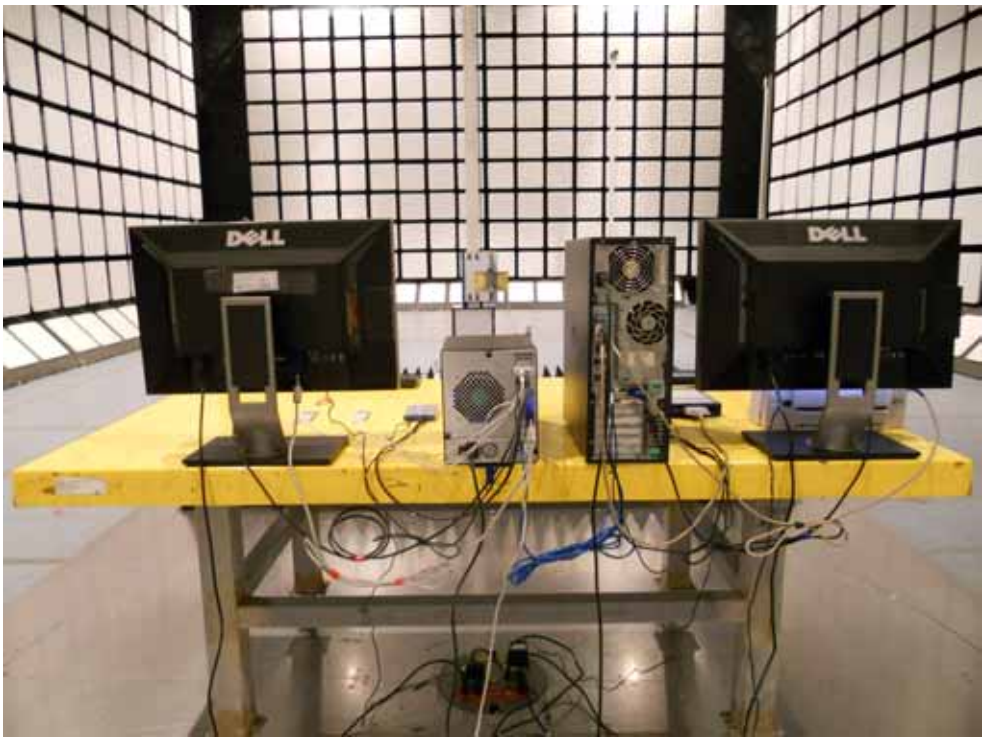
FRONT VIEW

REAR VIEW

● The photographs show the configuration that generates the maximum emission.
For Above 1GHz

FRONT VIEW

REAR VIEW



8. List of Measuring Equipment Used

Conducted Emission

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Test Receiver	R&S	ESCS 30	100357	9 kHz ~ 2.75 GHz	Nov. 18, 2011	Conduction (CO01-NH)
LISN	SCHAFFNER	NNB41	04/10053	9 kHz ~ 30 MHz	Nov. 17, 2011	Conduction (CO01-NH)
Power Filter	CORCOM	MR12030	N/A	30A*2	N/A	Conduction (CO01-NH)
RF Cable-CON	Suhner Switzerland	RG223/U	CB004	9 kHz ~ 30 MHz	Dec. 13, 2011	Conduction (CO01-NH)
EMC Receiver	R&S	ESCS 30	100132	9kHz ~ 2.75GHz	Feb. 08, 2012	Conduction (CO01-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832010001	9kHz ~ 30MHz	Mar. 02, 2012	Conduction (CO01-HY)
Impedance Stabilization Network	TESEQ	T800	23342	150kHz ~ 230MHz	Feb. 16, 2012	Conduction (CO01-HY)

Note: Calibration Interval of instruments listed above is one year.

Radiation Emission Below 1GHz

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Open Area Test Site	SPORTON	OATS-10	OS02-NH	30 MHz - 1 GHz 10m, 3m	Jan. 02, 2012	Radiation (OS02-NH)
Amplifier	BURGEON	BPA-530	100203	0.01 MHz - 3 GHz	May 24, 2011	Radiation (OS02-NH)
Receiver	R&S	ESCI	100497	9 kHz – 3 GHz	Apr. 17, 2012	Radiation (OS02-NH)
Bilog Antenna	CHASE	CBL6122B	2884	30 MHz - 2 GHz	Feb. 11, 2012	Radiation (OS02-NH)
Turn Table	EMCO	2080	9508-1805	0 - 360 degree	N/A	Radiation (OS02-NH)
Antenna Mast	ETS	2075-2	2385	1 m - 4 m	N/A	Radiation (OS02-NH)
RF Cable-R10m	MIYAZAKI	5DFB	CB044	30 MHz - 1 GHz	Sep. 16, 2011	Radiation (OS02-NH)

Note: Calibration Interval of instruments listed above is one year.

Radiation Emission Above 1GHz

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Amplifier	AGILENT	8449B	3008A02364	1 ~ 26.5 GHz	May 04, 2012	Radiation (10CH02-HY)
Horn Antenna	EMCO	3115	6903	1 ~ 8 GHz	May 04, 2012	Radiation (10CH02-HY)
Receiver	R&S	ESI	838496/008	20 Hz ~ 7 GHz	May 14, 2012	Radiation (10CH02-HY)
RF Cable 5M	SUHNER	SUCOFLEX 104	SN：304379/4	1 GHz ~ 18 GHz	Mar. 09, 2012	Radiation (10CH02-HY)
RF Cable 13M	SUHNER	SUCOFLEX 104	SN：16647/4	1 GHz ~ 18 GHz	Mar. 09, 2012	Radiation (10CH02-HY)
10m Semi Anechoic Chamber	TDK	SAC-10M	10CH02-HY	1 GHz ~ 6 GHz 3m	May 23, 2012	Radiation (10CH02-HY)

Note: Calibration Interval of instruments listed above is one year.

9. Certificate of VCCI

VCCI Council

CERTIFICATE

Company: SPORTON INTERNATIONAL INC.
<Member No. 466 >

Facility: CO01-NH
(Mains Ports Conducted Interference Measurement)

Location of Facility:
No.3, Lane 238, Kang Lo Street, Nei Hwu District,Taipei, 11424 Taiwan

This is to certify that the following measuring facility has been registered in accordance with the Rules for Voluntary Control Measures

Registration No.: C-247
Date of Registration: October 01 , 2011
This Certificate is valid until September 30 , 2014

VCCI Council

VCCI Council

CERTIFICATE

Company: Sporton International Inc.
<Member No. 466 >

Facility: Hwa Ya Conducted Test Site CO01-HY
(Telecommunication Ports Conducted Interference Measurement)

Location of Facility:
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiag, Tao Yuan Hsien Taiwan

This is to certify that the following measuring facility has been registered in accordance with the Rules for Voluntary Control Measures

Registration No.: T-1731
Date of Registration: February 09 , 2010
This Certificate is valid until February 08 , 2013

VCCI Council

VCCI Council

CERTIFICATE

Company: Sporton International Inc.
<Member No. 466 >

Facility: Nei-Hwu OS02-NH Test Site
(Radiation 10 meter site)

Location of Facility:
No.3, Lane 238, Kang Lo St., Nei Hwu District, Taipei, Taiwan

This is to certify that the following measuring facility has been registered in accordance with the Rules for Voluntary Control Measures

Registration No.: R-1906
Date of Registration: May 19 , 2010
This Certificate is valid until May 18 , 2013

VCCI Council

VCCI Council

CERTIFICATE

Company: Sporton International Inc.
<Member No. 466 >

Facility: Hwa Ya 10CH02-HY 10m Chamber

(Facility for measuring radiated disturbance above 1GHz)

Measurement Distance: 3 m Upper frequency validated: 6 GHz

Test Volume:Diameter 2 m,

Height (Top, Bottom): (2 m, 0 m)

Location of Facility:

No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiag, Tao Yuan Hsien Taiwan

This is to certify that the following measuring facility has been registered in accordance with the Rules for Voluntary Control Measures

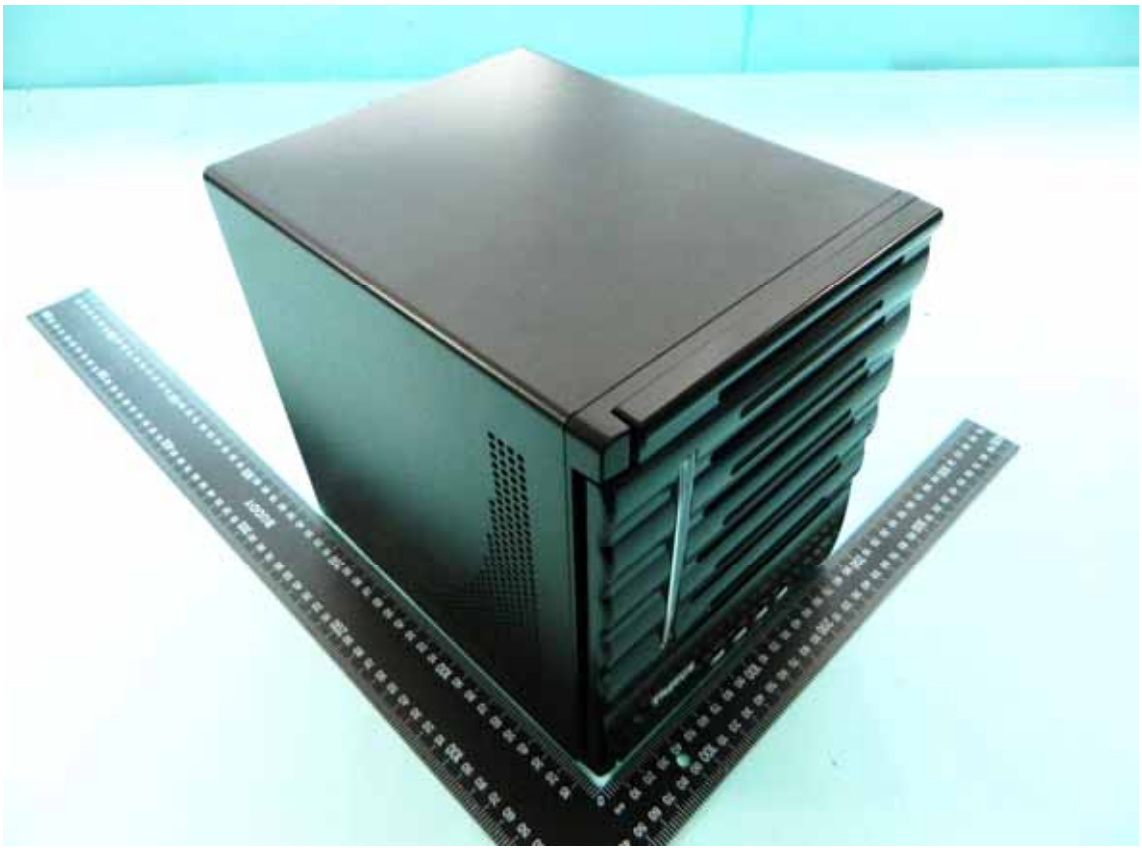
Registration No.: G-126

Date of Registration: February 09 , 2010

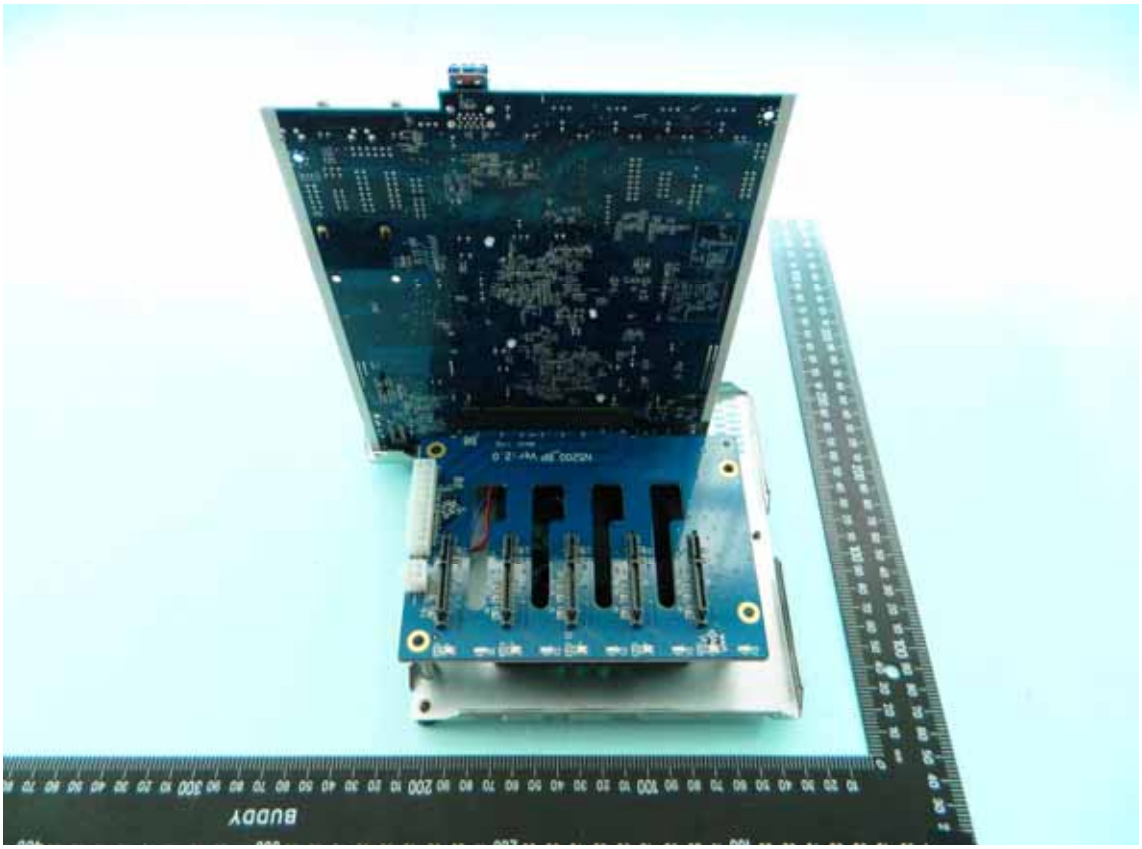
This Certificate is valid until February 08 , 2013

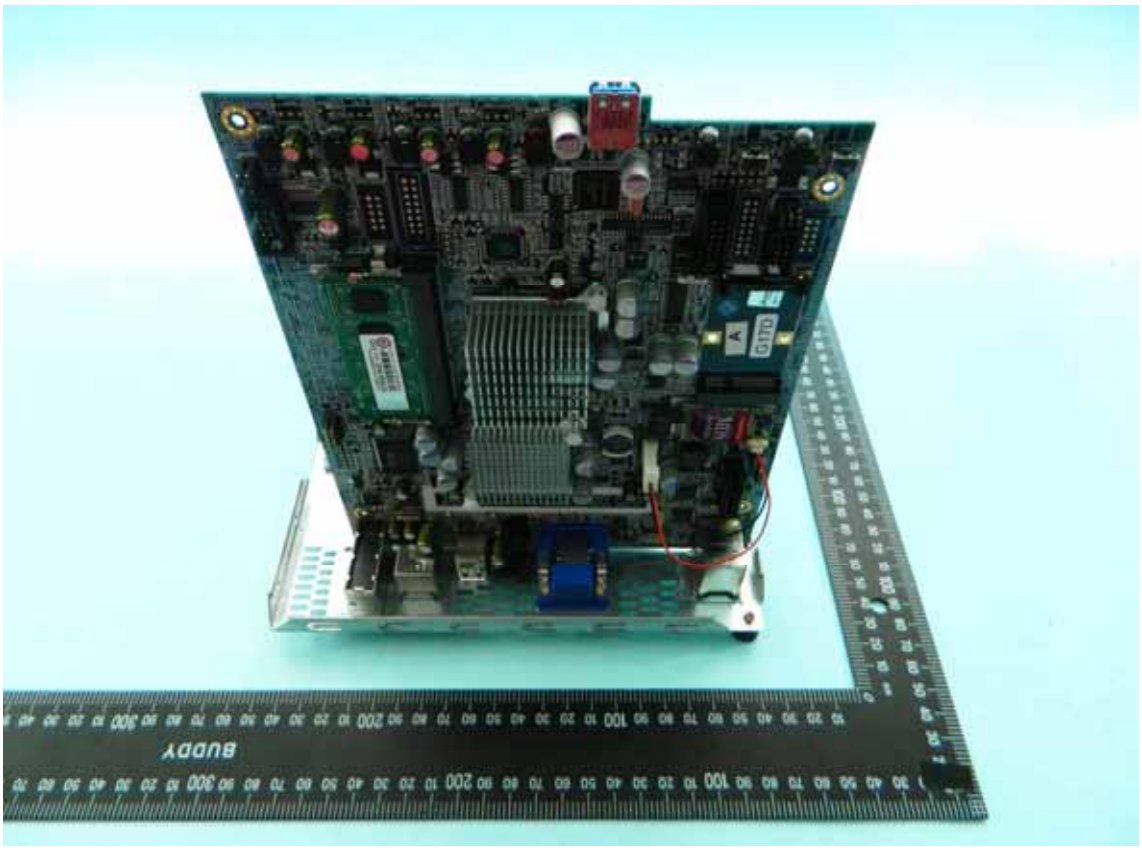
VCCI Council

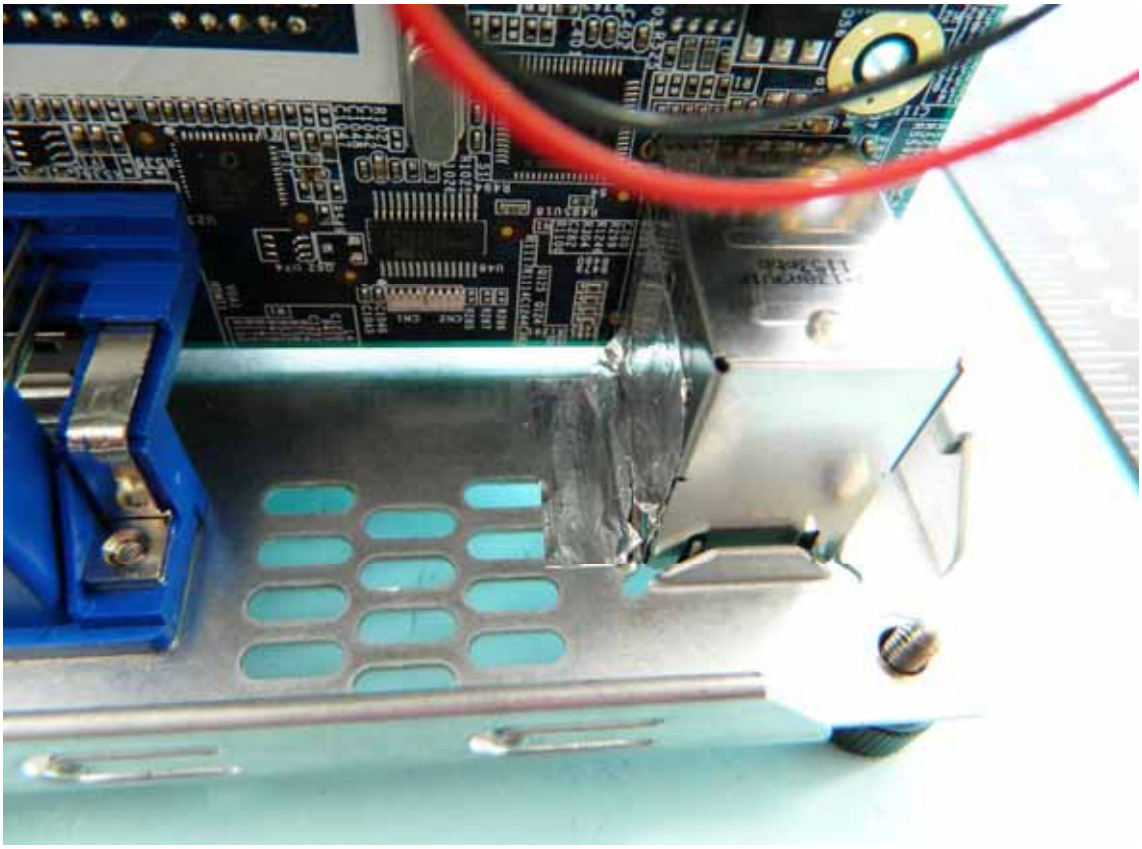
APPENDIX A. Photographs of EUT

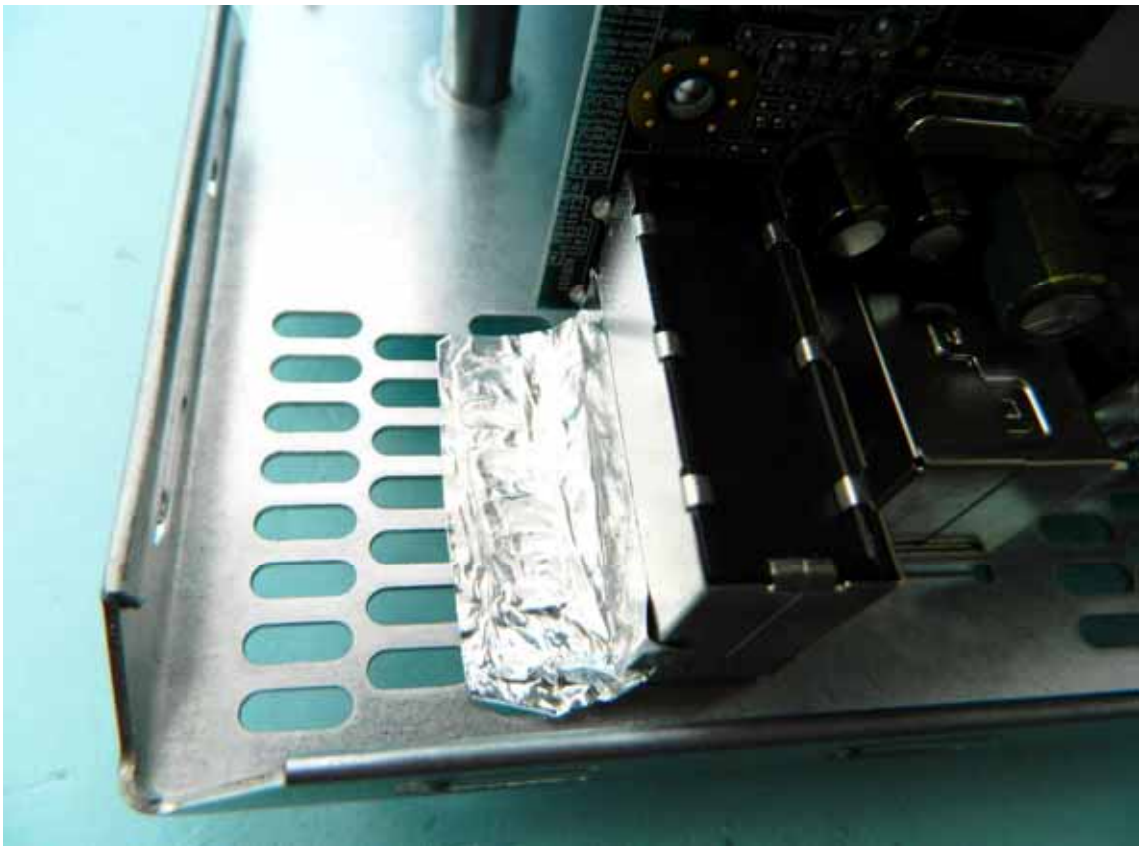


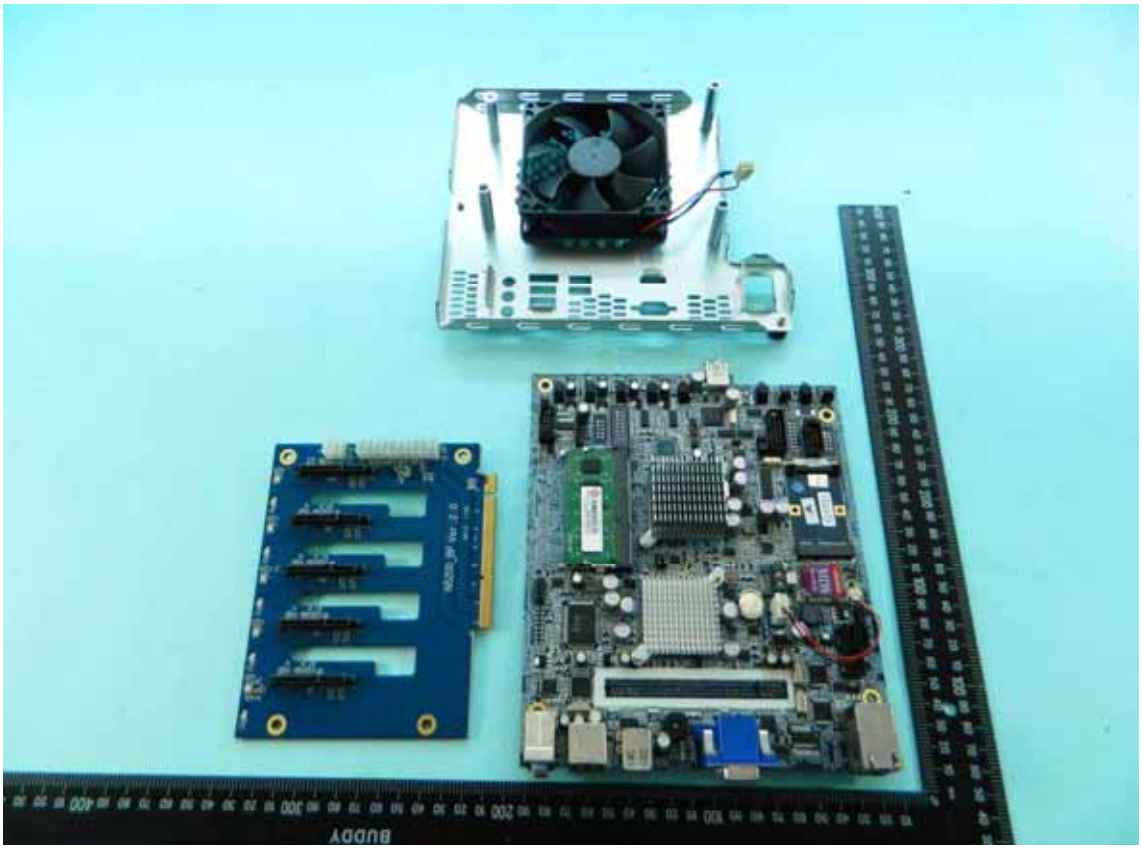
Warranty Void If Removed
N5550V1.01216125 Made in Taiwan
0014FD168F8A.8B ABD05060
Thecus®
N5550
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.
D33B79
RoHS
Compliant
Made in Taiwan

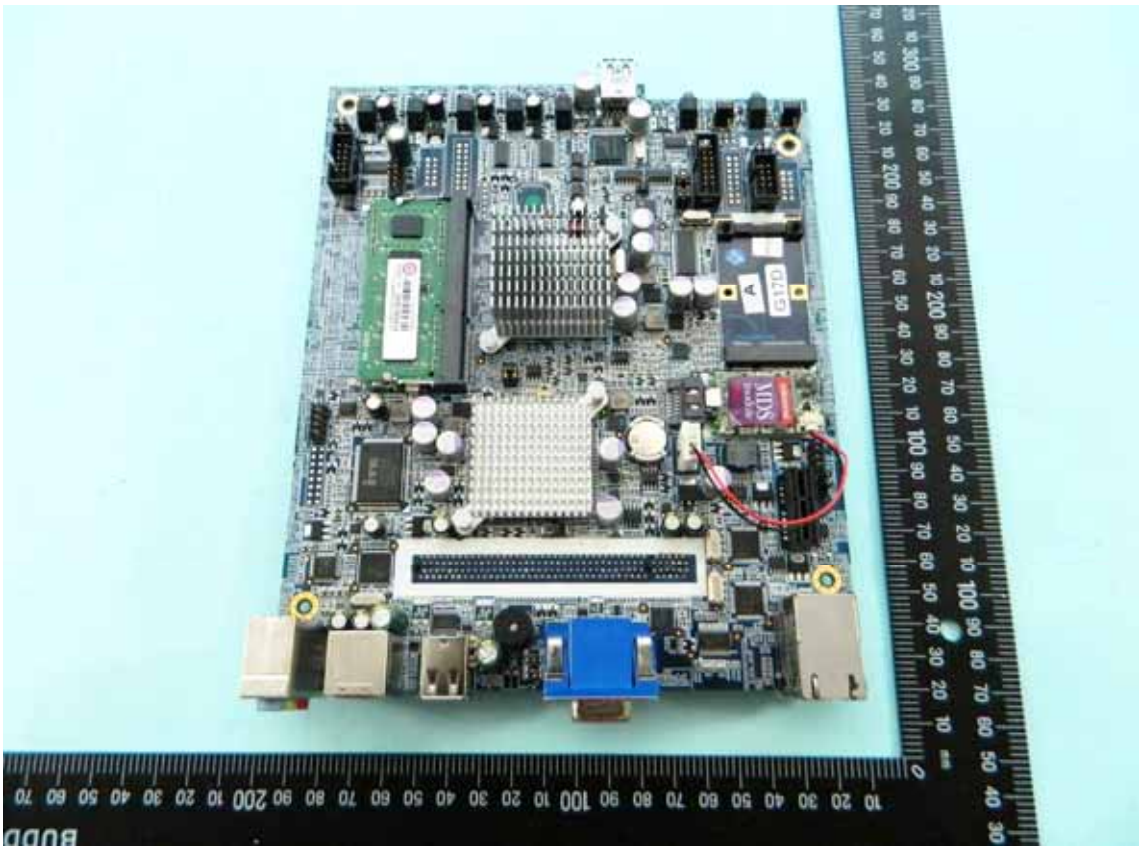


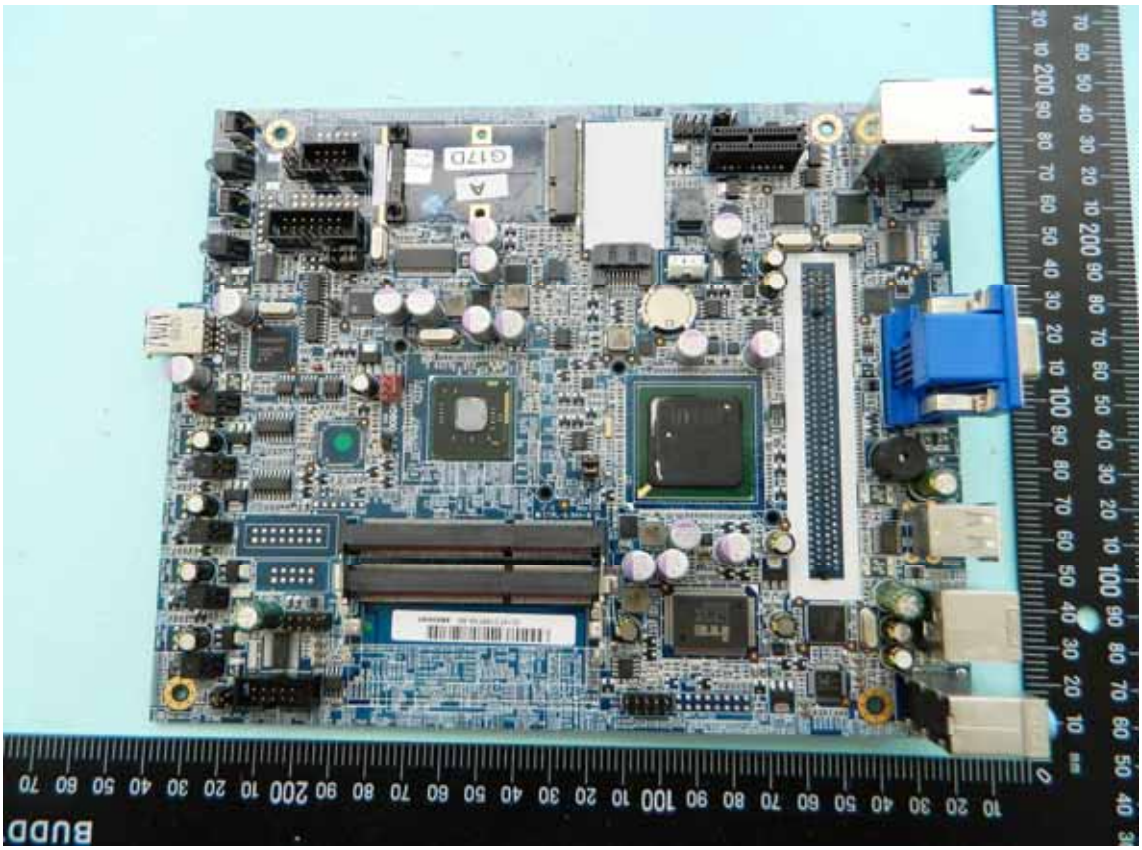


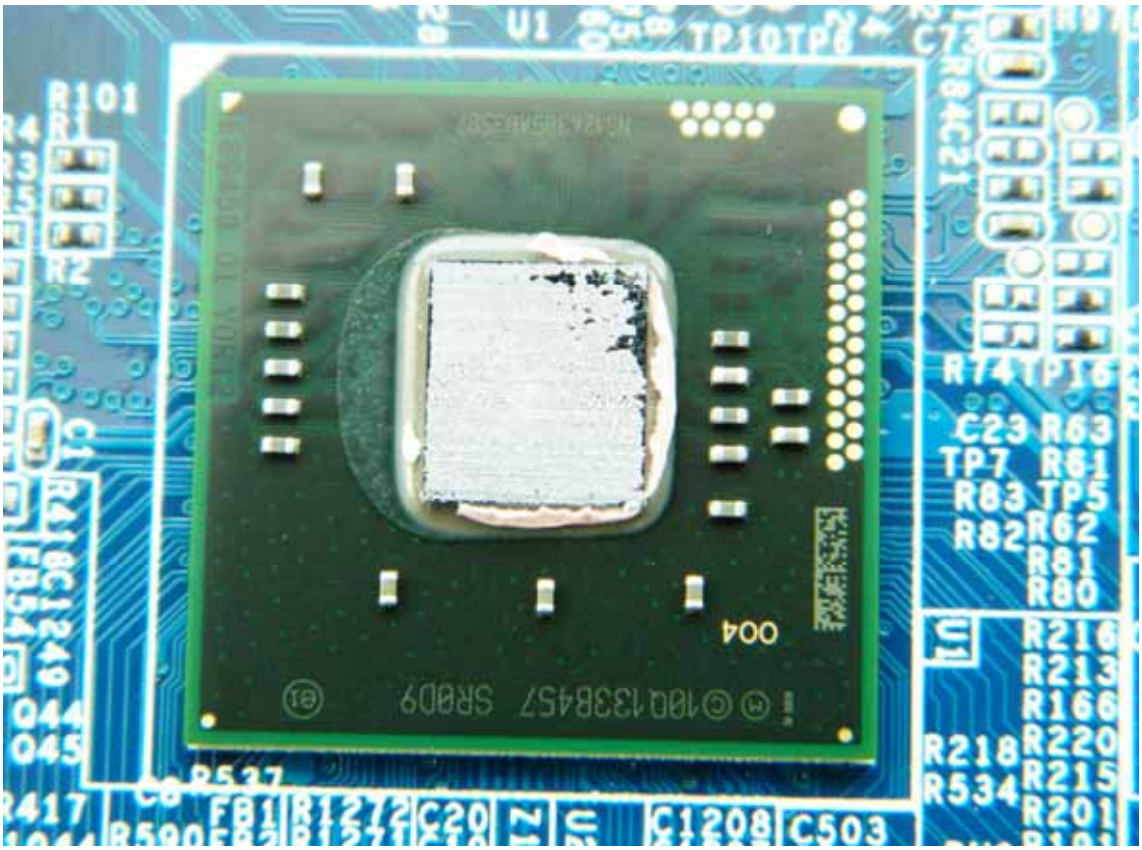











U1
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TP8
C73
R84
C21
R101
R74
TP16
C23
R63
TP7
R61
R83
TP5
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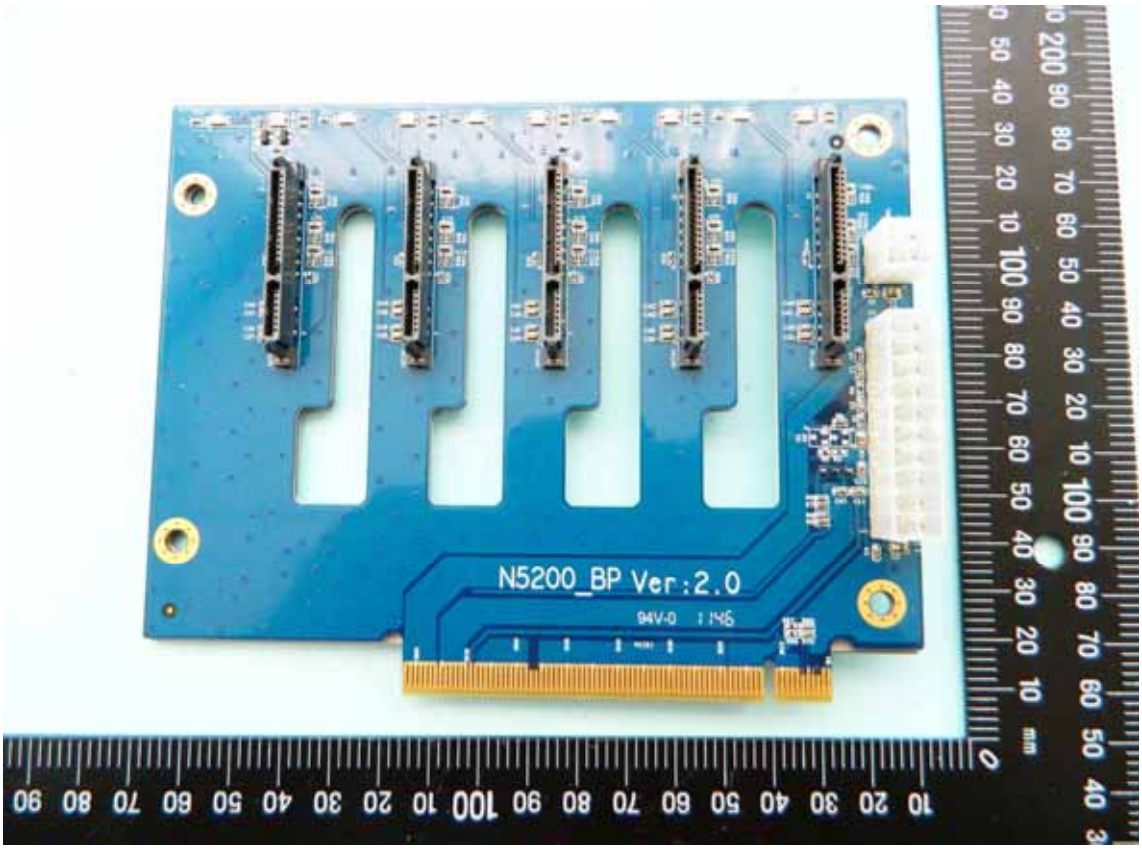
C1208
C503
004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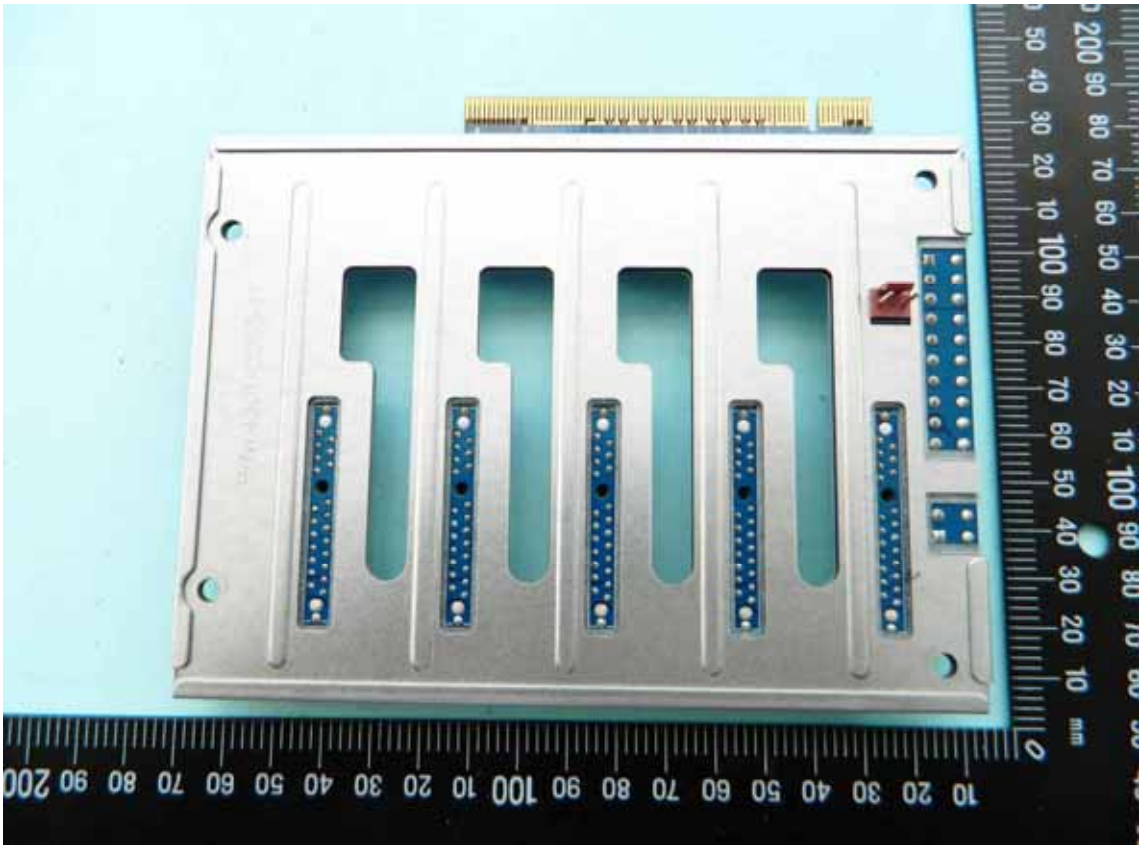
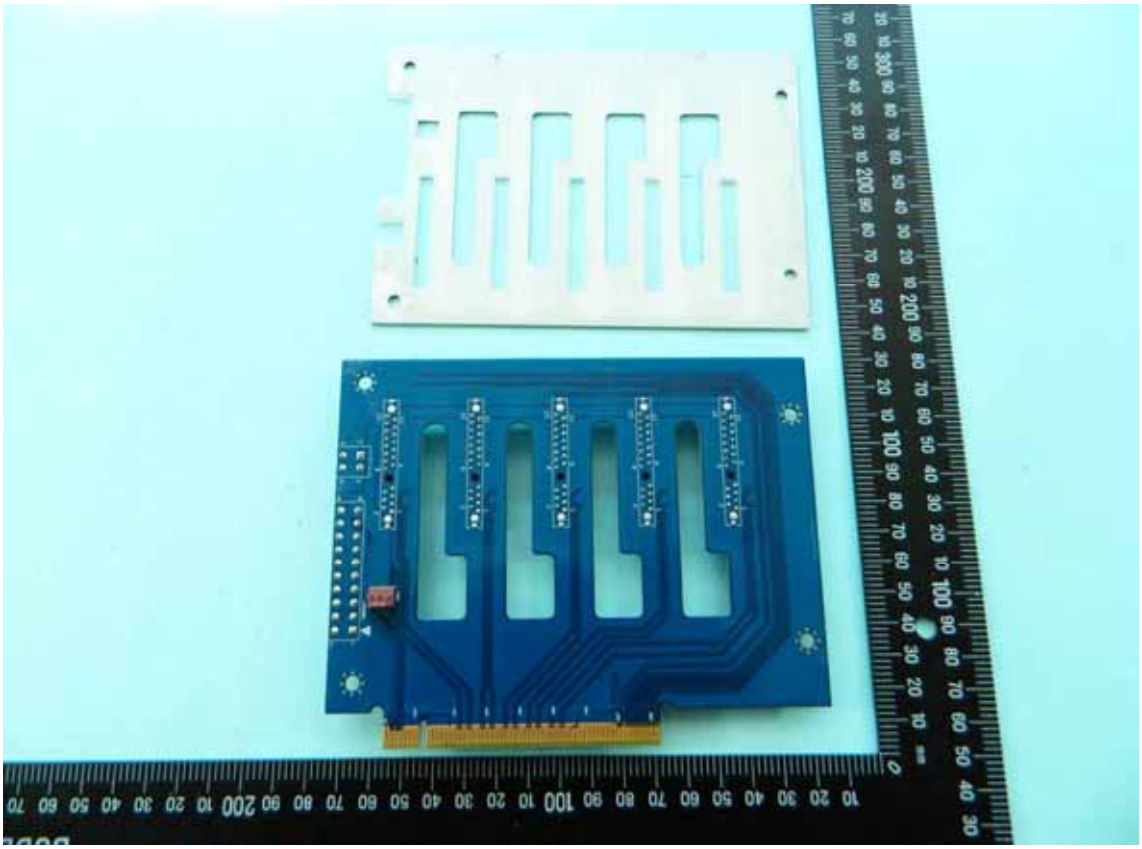
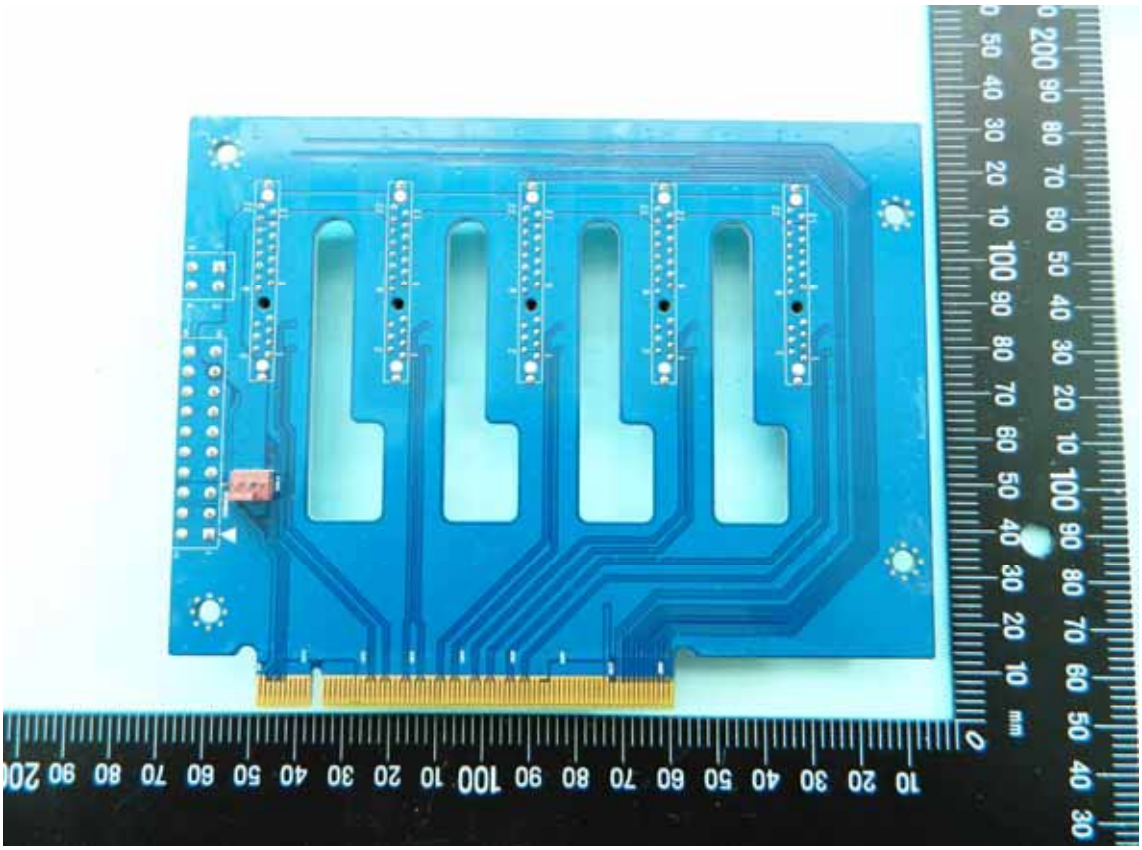
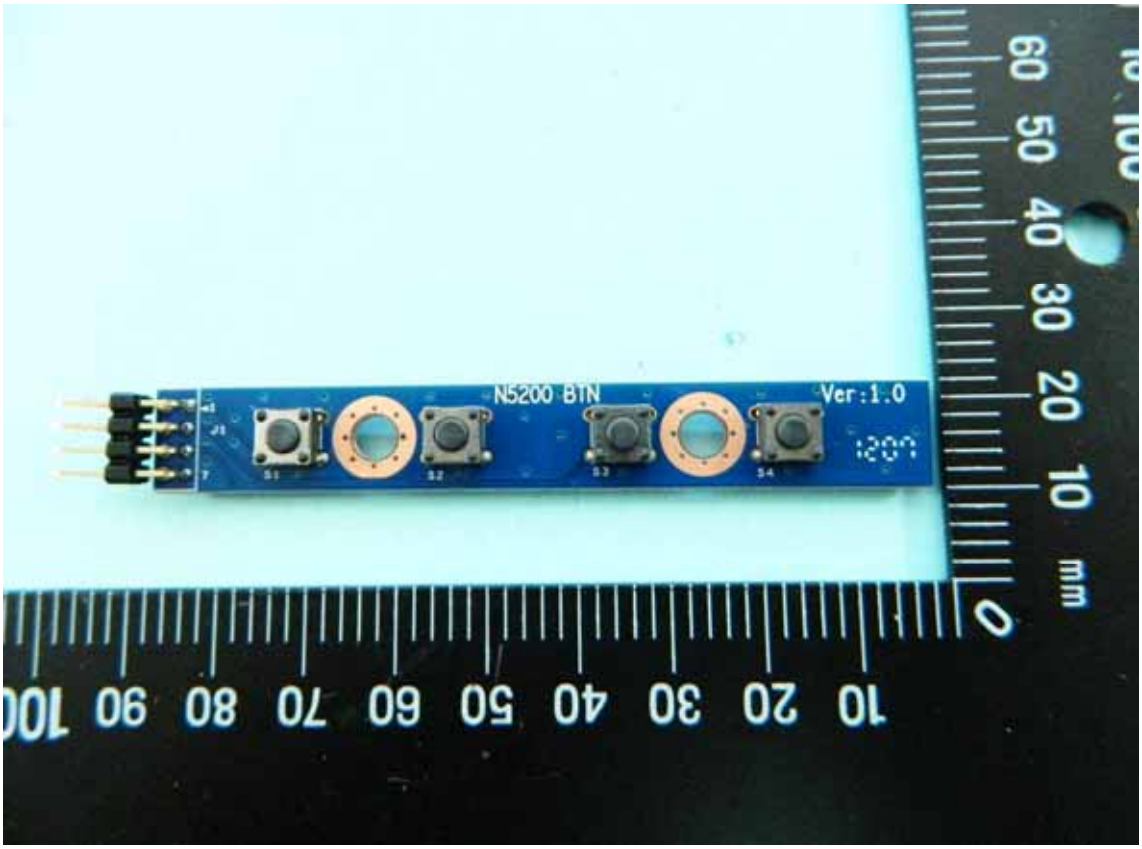
94V-0





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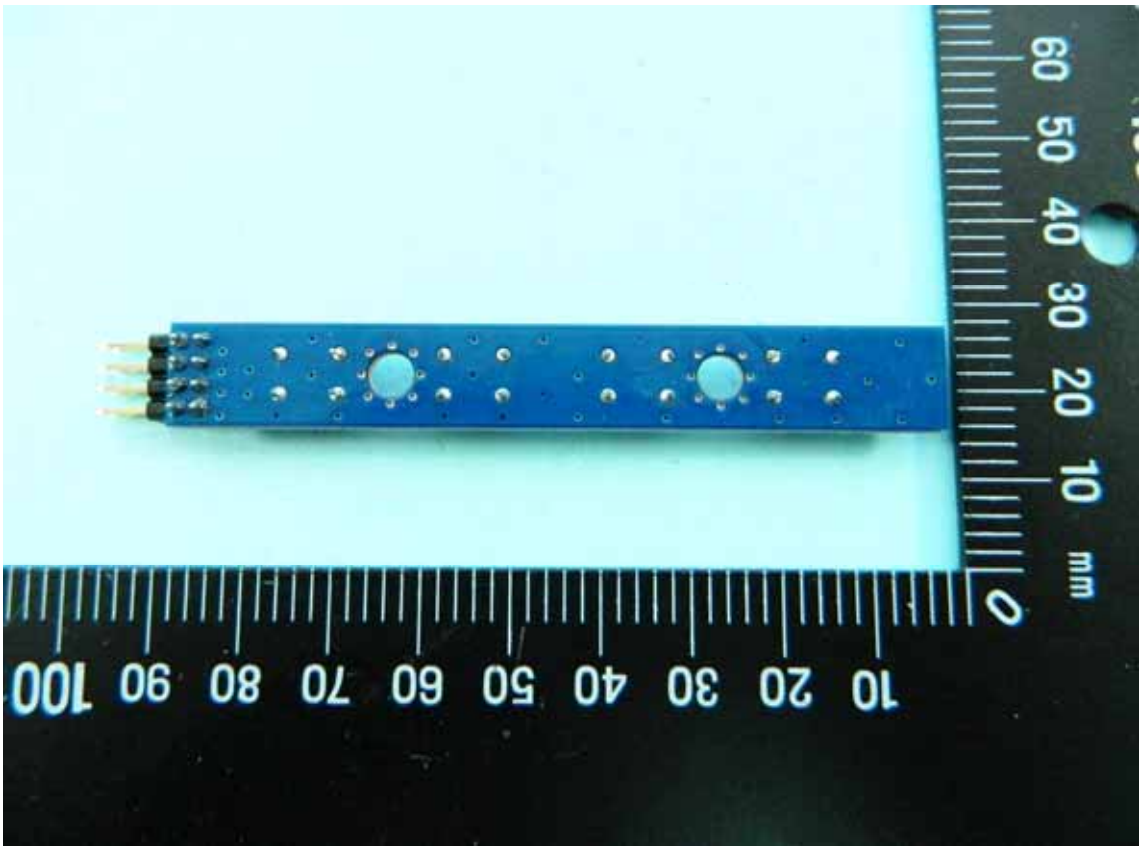
Ver:1.0
mm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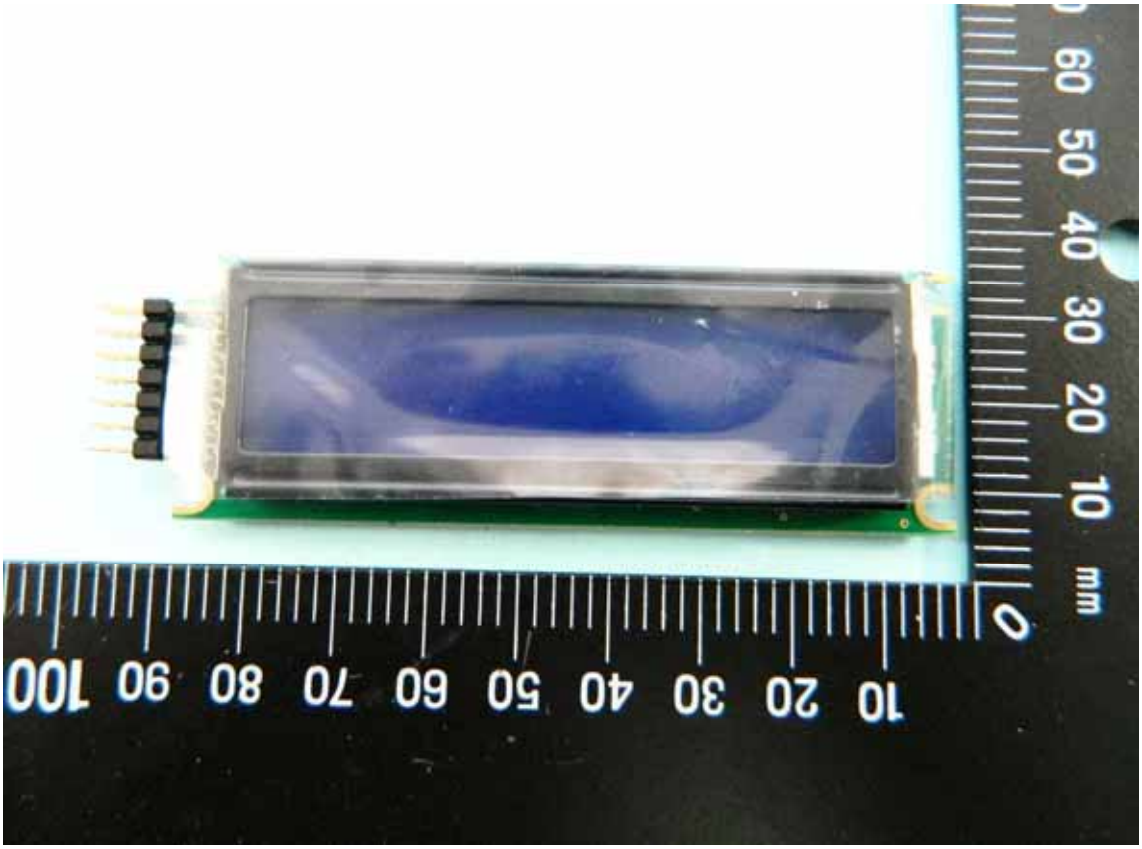

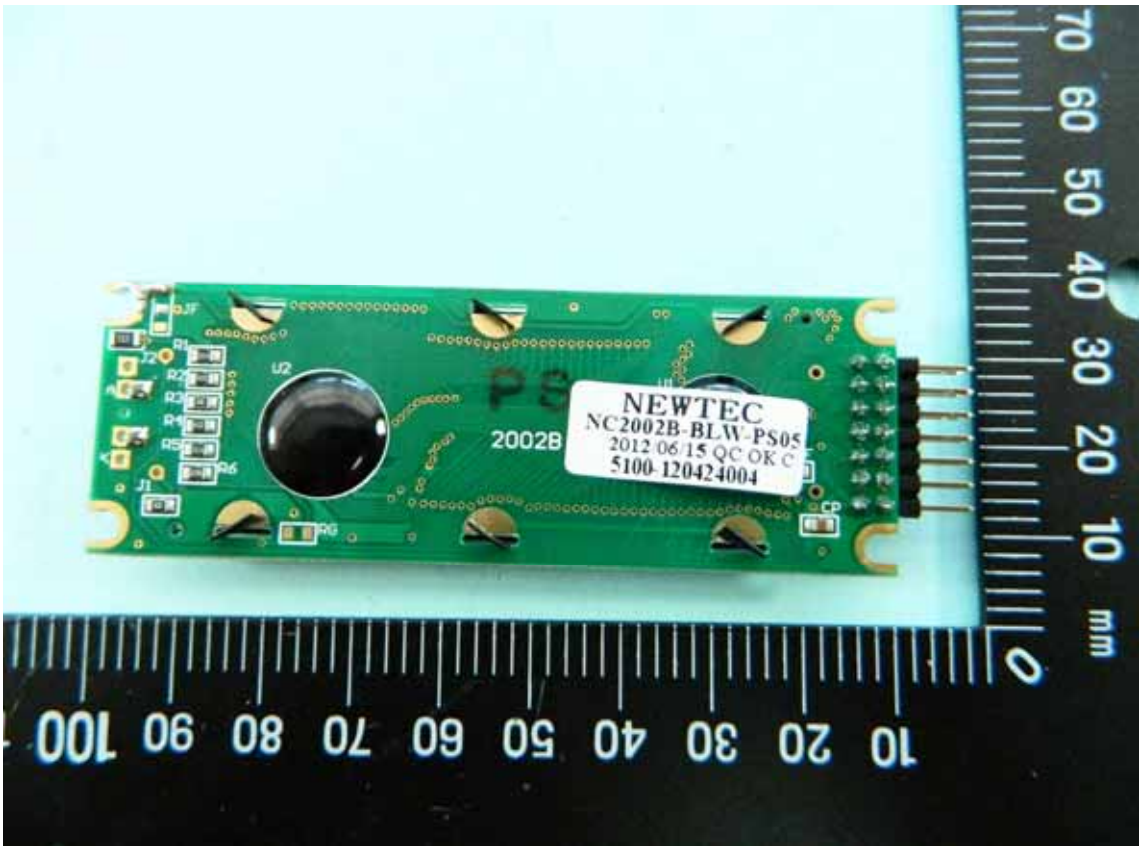
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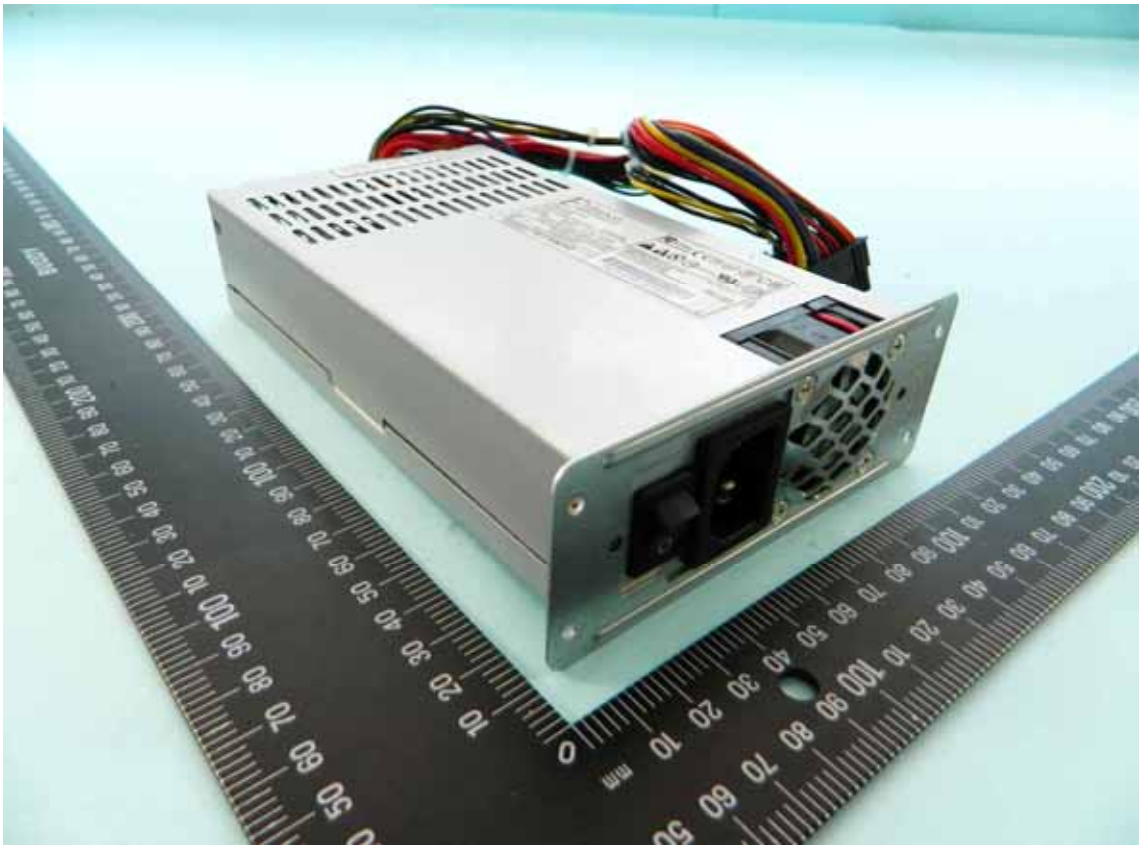

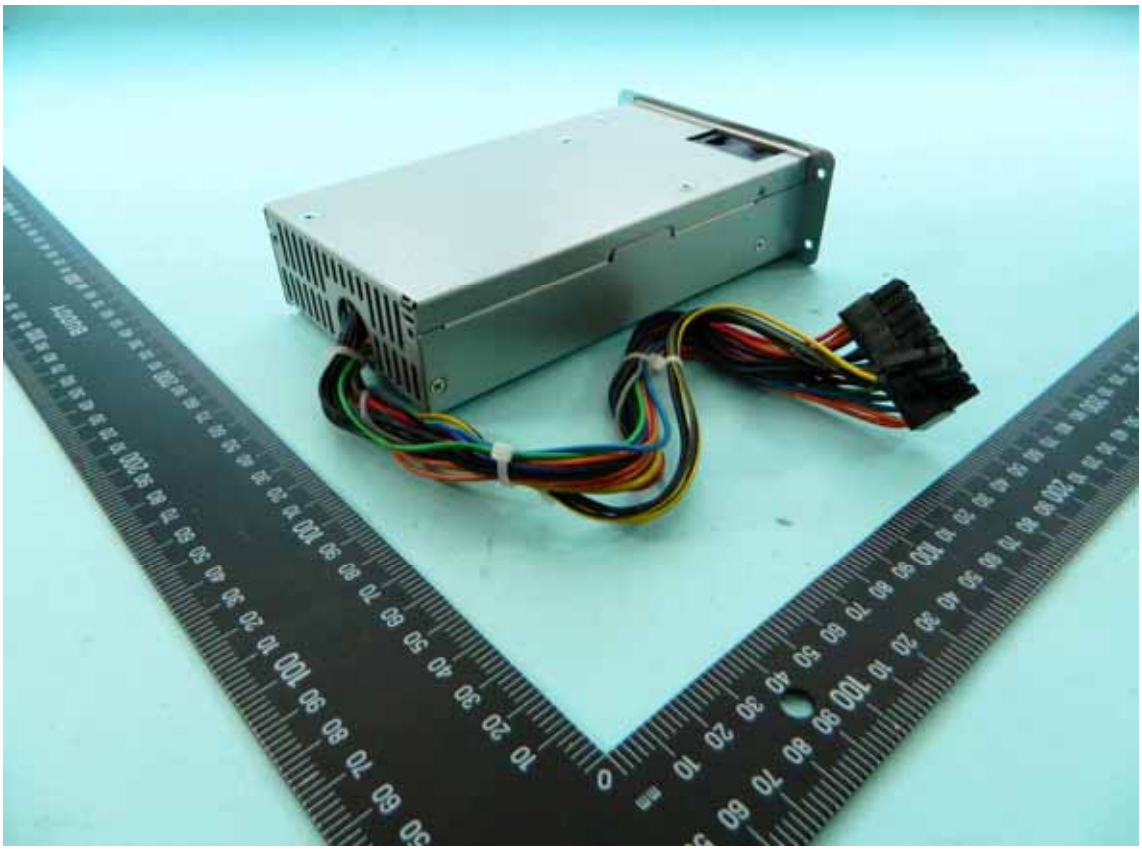

Enhance
ELECTRONICS CO., LTD.
MODEL NO: ENP-7020D
200 WATT W/PFC
POWER SUPPLY
FOR HOME OR OFFICE USE
AC INPUT
100-240V~ / 3-1.3A / 60-50Hz
DC OUTPUT
+3.3V +5V +12V1 +12V2 -12V +5Vsb
13A 14A 14A 14A 0.3A 2.0A
200W MAX.
WARRANTY VOID IF REMOVED
CAUTION! HAZARDOUS AREA
SELECT THE RIGHT VOLTAGE!
WITH FAN SENSOR CONTROL!
Made In China
ENP7020 006 120700102
R33228
E160947